
MCFSS

Techniques and Procedures



U.S. Marine Corps

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FOREWORD

1. PURPOSE

Fleet Marine Force Manual (FMFM) 6-18-1, *MCFSS Techniques and Procedures*, sets forth the techniques and procedures for employing the Marine Corps Fire Support System (MCFSS) within Fleet Marine Forces.

2. SCOPE

This manual is intended as a training and field reference for all personnel involved in automated fire support command and control. The automated techniques and procedures in this manual are based on those established in FMFM 6-18, *Techniques and Procedures for Fire Support Coordination*. This manual serves as an automated procedures supplement to FMFM 6-18 and is designed to be used with that publication.

3. SUPERSESSSION

None.

4. CHANGES

Recommendations for improving this manual are invited from commands as well as directly from individuals. Forward suggestions using the User Suggestion Form format to —

Commanding General
Doctrine Division (C 42)
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5. CERTIFICATION

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS



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USER SUGGESTION FORM

From:

To: Commanding General, Doctrine Division (C 422), Marine Corps
Combat Development Command, 2042 Broadway Street Suite 212,
Quantico, Virginia 22134-5021

Subj: RECOMMENDATIONS CONCERNING FMFM 6-18-1, *MCFSS
TECHNIQUES AND PROCEDURES*

1. In accordance with the Foreword to FMFM 6-18-1, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following unclassified recommendation is forwarded:

| <u>Page</u> | <u>Article/Paragraph No.</u> | <u>Line No.</u> | <u>Figure/Table No.</u> |
|-------------|------------------------------|-----------------|-------------------------|
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2. Proposed new verbatim text: (Verbatim, double-spaced; continue on additional pages as necessary.)

3. Justification/source: (Need not be double-spaced.)

Note: Only one recommendation per page.

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MCFSS Techniques and Procedures

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Chapter 1

MCFSS Employment

The Marine Corps Fire Support System (MCFSS) automates fire support command and control functions by using digital devices and data communications to collect, process, and distribute information quickly and accurately. It incorporates systems already employed by the Marine Corps and employs their full data communications capability. These systems include the Battery Computer System (BCS), the Meteorological Data System (MDS), and the Firefinder Countermortar Radar (CMR). MCFSS also uses some new, off-the-shelf technology and U.S. Army systems such as the Initial Fire Support Automation System (IFSAS), which is Army Tactical Fire Direction (TACFIRE) System software ported to a Lightweight Computer Unit (LCU).

1001. Introduction to MCFSS

MCFSS is an automated fire support system that has evolved from the Fireflex testbed.

a. Background

In 1963 the artillery launched its first effort toward automation with the fielding of the M18 Field Artillery Digital Automatic Computer (FADAC). This computer provided battery-center to center-of-target technical solutions for artillery of the time. Then in 1978 the Army began fielding TACFIRE, which automated tactical fire control. TACFIRE was an equipment heavy system and was not fielded to the Army's light divisions, National Guard, or Reserve. The TACFIRE program was subsequently ported into smaller computers as technology was developed in the 1980s. This system was referred to as Lightweight TACFIRE (Light TACFIRE or LTACFIRE) and was fielded to the Army's light divisions in battlefield computer terminals (BCT). In 1987 the Marine Corps initiated the Fireflex testbed, using Light TACFIRE and several other off-the-shelf software and hardware, with the intent of acquiring knowledge and expertise in automated fire support systems. In 1993 the Army began fielding IFSAS to the National Guard and Reserves. IFSAS is basically Light TACFIRE

ported into a modern ruggedized, off-the-shelf 80486 computers. IFSAS will also replace TACFIRE in Army heavy units and augment Light TACFIRE in light units.

b. System Description

MCFSS is an interim system for which the objective system is the Advanced Field Artillery Tactical Data System (AFATDS). The MCFSS is built around the following systems:

- The AN/GYG-1(V) Battlefield Computer Terminal with Light TACFIRE software for artillery fire direction centers (FDCs) at battalion and regimental level.
- The AN/GYK-37 Lightweight Computer Unit, with IFSAS software, at force fires coordination centers (FFCCs), fire support coordination centers (FSCCs), and other nodes.
- The AN/GYK-37 Lightweight Computer Unit with BCS software at the battery FDC.
- The AN/TPQ-36 (Q-36) Firefinder Countermortar Radar at the artillery regiment.
- The AN/TMQ-31 Meteorological Data System at the artillery regiment.
- The AN/PSC-2A Digital Message System (DMS) with artillery forward observers.

1002. Capabilities

MCFSS significantly increases the efficiency of fire support available to maneuver commanders. It increases communications speed and accuracy without affecting command relationships or the doctrine, tactics, techniques, and procedures for fire support. MCFSS is made up of computers and related components which automate some command and control functions of fire support. These computers automate not only tactical and technical fire direction, but can process and disseminate —

- Conventional fire plans.
- Target information.
- Fire support coordination measures (FSCMs) and other battlefield geometry such as forward line of troops (FLOT) and unit zones.
- Firing unit and ammunition information.
- Meteorological and survey information.
- Fire missions generated by incoming target intelligence.

1003. MCFSS Principles

The following principles are based on lessons learned during the Fireflex Testbed as well as lessons learned from 15 years of Army experience with TACFIRE.

- a. MCFSS is a system.** The MCFSS comprises many different computers and other devices. If the system is to operate smoothly and support the maneuver commander's operation, all devices in the system must operate on an integrated operating setup and communications scheme. If all elements of the system are not integrated, the *system will not work*. The basis for the integration of MCFSS is this publication and the unit's standing operating procedure (SOP).
- b. MCFSS does not replace the need for manual/voice backup.** Due to the complexity of MCFSS, the entire system will not be working at all times. MCFSS is dependent on solid communications which will not always be possible due to distances and interference. In these circumstances the unit must have manual backups in place to be able to accomplish the mission.
- c. MCFSS has an Achilles Heel — communications.** The most practiced procedures and the best running automated computers in the world will not allow MCFSS to work if they cannot communicate. The communications problem is twofold. First, communications parameters in all devices must be in agreement if they are to communicate. Settings at different devices on a net cannot be changed without notification of, and agreement from, the net control station (NCS). Second, time and attention must be paid to communications equipment used for data transmission.
- d. MCFSS sustainment training must be a priority.** MCFSS uses computers that are designed to be user friendly *but* they require constant operator training. The skills needed to operate the computers are *very perishable* and require continuous practice in order for an operator to maintain his proficiency. A unit's ability to integrate all elements of MCFSS is equally perishable. The Individual Training Standards (ITSs) should be used for the basis for operator and supervisor sustainment training. Unit sustainment training should be based on this publication and the unit's MCFSS SOP.

e. **MCFSS is only a tool to be used to accomplish the mission.** If a task can be done faster and easier by manual methods, do not force MCFSS to work at the expense of the timely execution of your unit's mission. During exercises, this must be balanced with the requirement for sustainment training.

1004. Interoperability

MCFSS is interoperable with the following systems:

- Army TACFIRE, Light TACFIRE, and IFSAS.
- Multiple Launch Rocket System (MLRS) Fire Direction Systems (FDS).
- AFATDS.
- Army Ground Station Module (AGSM). The AGSM is a computer that receives combat intelligence from the Air Force's joint surveillance, target attack radar system (JSTARS) aircraft.
- Lightweight Ground Station Module (LGSM). The LGSM is the vehicle-mounted variant of the AGSM.
- Airborne Target Handover System (ATHS). The ATHS is found in Army OH-58D aircraft.
- Artillery automated data processing (ADP) systems of other nations under NATO standard agreement (STANAG) 5620.

Chapter 2

Fire Support Communications

2001. General

The ability of FFCCs, FSCCs, and FDCs to perform their missions depends on reliable communications. Fire support and artillery communication nets provide voice and data communications over frequency modulation (FM), high frequency (HF), wire, and multi-channel equipment. Voice and data transmissions are not compatible on the same net unless the voice operators are well trained in this procedure. Voice communications on a data net should be limited to initially establishing and reestablishing communications, and when operations are degraded. The fire support communication net structure optimizes the capabilities of available digital data devices while maintaining a voice capability. The depicted communications architecture is different from the previous voice-only communications architecture. The function and names of some nets may differ significantly from those previously used.

2002. Data Communications Nets

a. Marine Expeditionary Force (MEF) Force Fires Coordination (MEF FFC) Net

(1) **Purpose.** The MEF FFC Net provides a means for overall coordination with all major command elements of the MEF or MEF (forward) [MEF(F)].

(2) **Composition**

- MEF or MEF(F) FFCC (NCS)
- Supporting Arms Coordination Center (SACC)
- Subordinate Marine Expeditionary Unit (MEU) FFCC
- Division FSCC(s)
- Rear Area Operations Center (RAOC)
- Adjacent units

b. MEU Force Fires Coordination (MEU FFC) Net

(1) **Purpose.** The MEU FFC Net provides a means for overall coordination with all major command elements of the MEU.

(2) Composition

- MEU FFCC (NCS)
- SACC
- Battalion FSCC(s)
- RAOC
- Adjacent units
- Artillery battery FDC

c. Division Fire Support Coordination (Div FSC) Net

(1) **Purpose.** The Div FSC Net provides a division level data net for fire support coordination and planning. The net provides a means to exercise command and control data and for the dissemination of tactical information and reports for all agencies of the division FSCC, including air and naval gunfire. Data communications between the division FSCC and battalion FSCCs is available via relay at the regimental FSCC if required.

(2) Composition

- Division FSCC (NCS)
- Artillery regiment FDC
- Infantry regiment FSCC
- Direct Air Support Center (DASC) (If DASC is collocated with the division FSCC, communications are established via wire.)
- Target processing center (TPC) via relay through the artillery regiment FDC

d. Artillery Regiment Fire Direction (Regt FD) Net

(1) **Purpose.** The Regt FD Net is the tactical fire direction data net used by the artillery regiment to transmit orders, fire missions, tactical information, fire planning, and meteorological data to its battalions. The battalions use this net to request additional artillery support from the artillery regiment and to provide reports in data formats. When a separate

battalion fire direction net is not established, this net will also be used to request additional support from a reinforcing battalion. The net also provides the principal link between the artillery regiment and its battalions for collecting, exchanging, and disseminating combat information and intelligence.

(2) Composition

- Artillery regiment FDC (NCS)
- Artillery battalion FDCs
- TPC via relay through the artillery regiment FDC

e. Regimental Fire Support Coordination (Regt FSC) Net

(1) Purpose. The Regt FSC Net is the data fire support and coordination net for the infantry regiment. This net provides a means of exchanging tactical information between the regimental and battalion FSCCs and the supporting artillery battalion FDC. Message traffic related to fire planning is sent over this net. Though subscribers to the Regt FSC Net, battalion FSCCs and the supporting artillery battalion FDC do not communicate with each other on this net. Communications between the battalion FDC and the battalion FSCCs are accomplished on the conduct of fire nets.

(2) Composition

- Infantry regiment FSCC (NCS)
- Artillery battalion FDC in direct support (DS) (also referred to as DS battalion)
- Maneuver battalion FSCCs

NOTE: All artillery battalions are organized to perform any of four tactical missions. Prefacing battalion with "DS" or another of the mission acronyms (GS=general support, R=reinforcing, GSR=general support-reinforcing) indicates its current mission, not its structure or capability.

f. Artillery Battalion Conduct Of Fire (COF) Nets 1, 2, 3 and 4 (COF 1/2/3/4)

(1) Purpose. The battalion COF nets are the primary means for artillery forward observers to request and adjust artillery fire and to provide tactical

information to higher headquarters. Data COF nets function as a combination of COF and FD voice nets. One COF net is normally provided to each supported maneuver battalion. COFs 1 and 2 may be combined to create COF A, and COFs 3 and 4 may be combined to create COF B as dictated by the availability of communications equipment and the situation. Artillery forward observers (FOs), a firing battery FDC, and the battalion FDC are assigned to each net. Depending upon the degree of centralization of tactical fire control, the FO may send his call for fire to the artillery battalion FDC, or maneuver battalion FSCC. The COF nets must be uncluttered and responsive. The artillery battalion must control message traffic to prevent a proliferation of data messages that should be sent over other nets or by other means.

(2) Composition

- Artillery battalion FDC (NCS)
- Maneuver battalion FSCCs
- Firing battery FDCs (NCS during MEU operations)
- Artillery FOs

g. Battalion Fire Direction (Bn FD) Net

(1) Purpose. The data Bn FD Net is activated to provide a direct link between the DS battalion and its R battalion's FDC. This is an optional net with the primary method being communication between the DS and R FDCs on the Regt FD Net.

(2) Composition

- DS artillery battalion FDC (NCS)
- R artillery battalion FDC
- Radars in DS of the artillery battalion
- MDS in DS of the artillery battalion

h. Meteorological Data/Radar Telling (Met/Rdr Tel) Net

(1) Purpose. The Met/Rdr Tel Net links the TPC, the meteorological (met) platoon's met stations, and the counterbattery radar (CBR) platoon's radar sections. The TPC is equipped with a BCT/LCU and functions as a filter for target acquisition and meteorological data entering the system. The TPC operates in artillery target intelligence mode 3 (**ATI MODE 3**) and performs the targeting functions associated with counterfire planning.

(2) Composition

- TPC (NCS)
- Q-36 radar sections
- MDS/Meteorological Measuring System (MMS) stations
- Unmanned aerial vehicle (UAV) observer equipped with DMS (when controlled by the artillery regiment)

i. TPC Wire Net

(1) Purpose. The TPC Wire Net links the TPC to the collocated artillery regiment FDC. This wire net provides the TPC with its link to other stations by relay available through the regimental FDC device.

(2) Composition

- Artillery regiment FDC (NCS)
- TPC
- Division FSCC via relay through artillery regiment FDC
- Infantry regiment FSCCs via relay through the artillery regiment FDC
- Artillery battalion FDCs via relay (if required)

j. Data Communications Guard Chart

Figure 2-1 provides the net assignment of subscribers and the communications parameters for the operation of each net.

| LEGEND: C=Net Control X=Guard R=Relay A=As Required | MEF FFC Net | MEU FFC Net | Div FSC Net | Regt FD Net | Regt FSC Net | Bn FD Net | Bn COF Nets 1,2,3,4 | TPC Wire Net | Met/ Rdr Tel Net |
|--|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|--------------------------|--|-----------------------------|-------------------------------------|
| MEF FFCC | C | | | | | | | | |
| MEU FFCC | | C | | | | | | | |
| Division FSCC | X | | C | | | | | R | |
| DASC | | | X | | | | | | |
| RAOC | X | X | | | | | | | |
| Regimental FSCC | | | X | | C | | | R | |
| Battalion FSCC | | X | | | X | | X | | |
| Regimental FDC | | | X | C | | | | C | |
| TPC | | | R | | | | | X | C |
| DS Battalion | | | | X | X | C | C | | |
| R Battalion | | | | X | | A | | | |
| GS Battalion | | | | X | | A | C | | |
| GSR Battalion | | | | X | | A | C | | |
| Battery 1,2,3,4 | | A | | | | | X | | |
| FO | | | | | | | X | | |
| CBR Platoon | | | | | | A | | | X |
| Met Platoon | | | | | | A | | | X |
| UAV FO | | | | | | | | | A |

Figure 2-1. Data Communications Guard Chart

k. Reducing the Number of Operating Nets

The stations operating the greatest number of data nets are at the regimental level and lower with the battalion FDC operating the most nets. Figure 2-2 displays the battalion FDC operating seven nets. This configuration requires two BCTs at the battalion FDC.

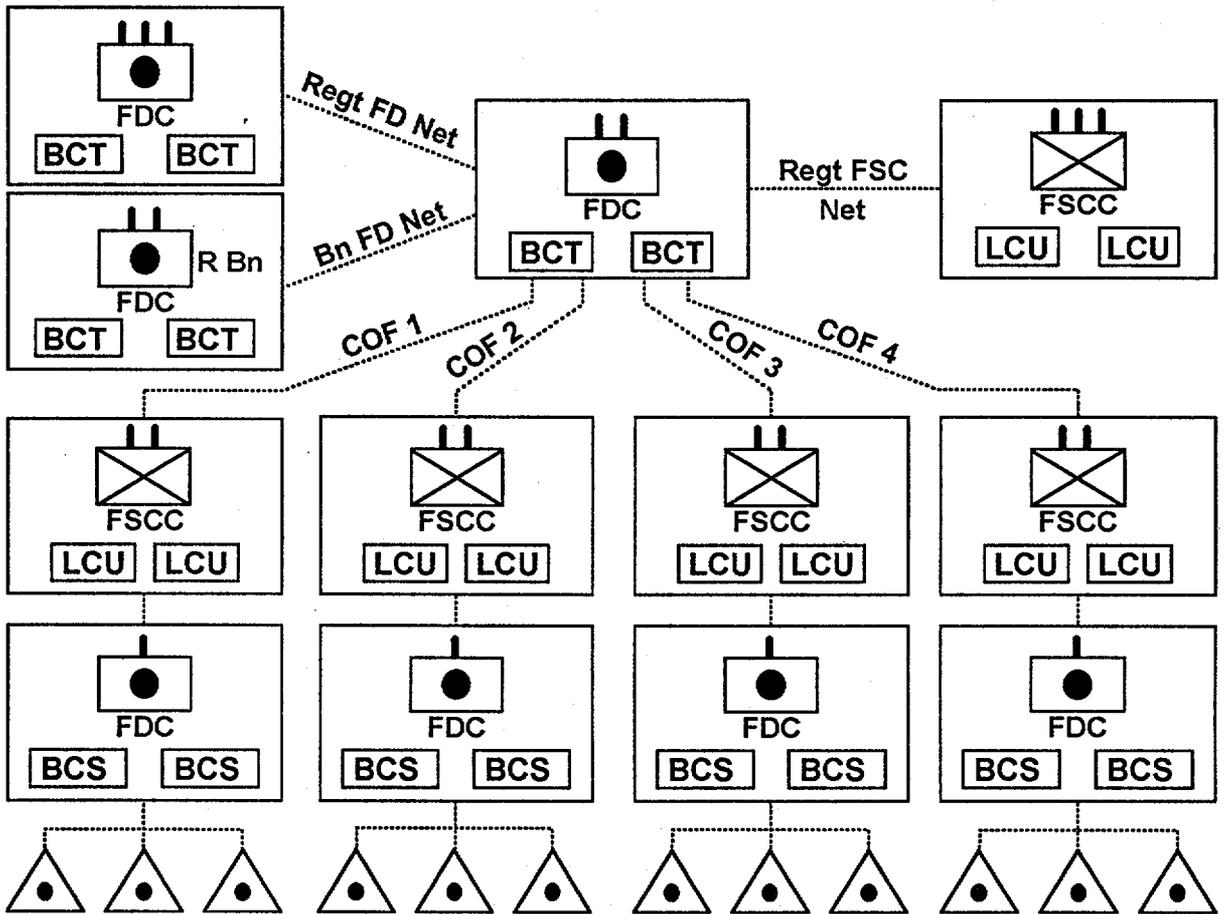


Figure 2-2. Battalion FDC Operating Seven Data Communications Nets

Figure 2-3 shows the same battalion FDC operating only four nets. Subscribers on COF 1 and 2 are combined to form COF A. Subscribers on COF 3 and 4 are combined to form COF B. The Bn FD Net is eliminated by moving the reinforcing battalion to the Regt FD Net.

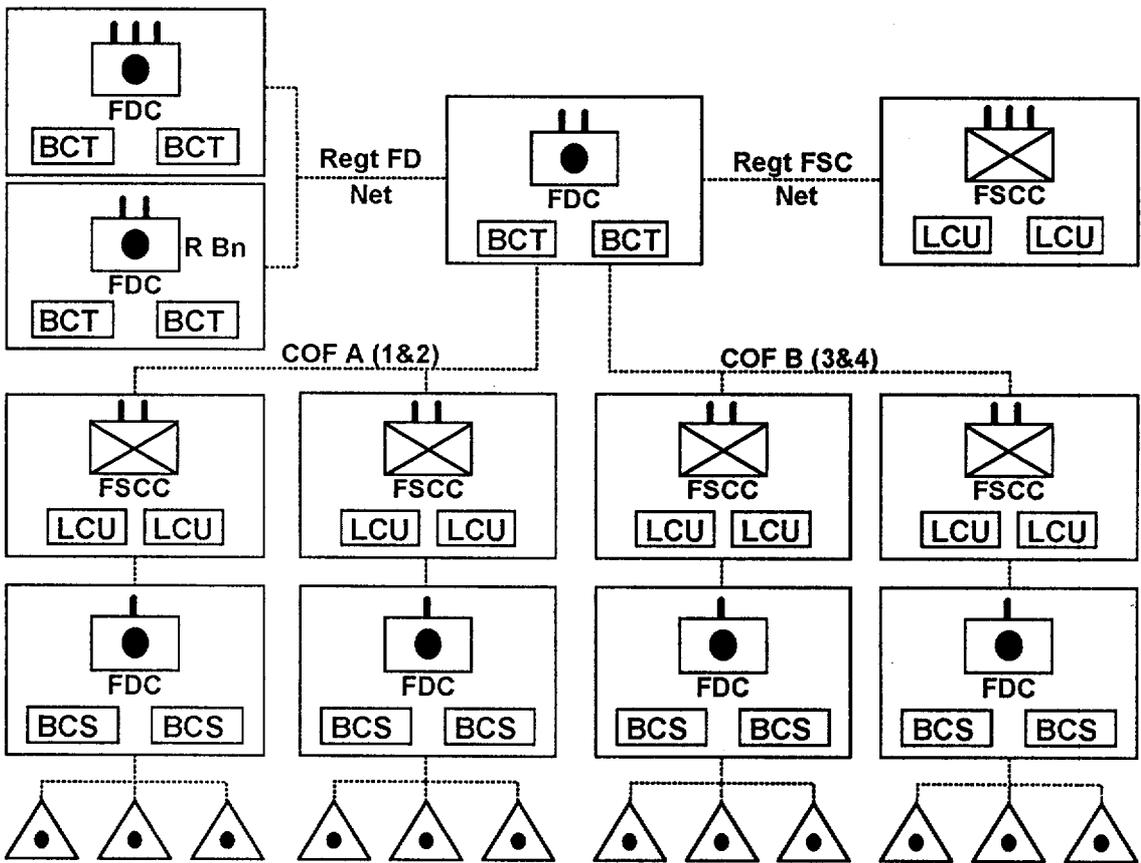


Figure 2-3. Battalion FDC Operating Four Data Communications Nets

2003. Communications Parameters

a. Requirements

Communications parameters provide all stations with the necessary data to build and operate the nets. Refer to the appropriate equipment technical manuals for specific equipment requirements.

b. Priority

Net sensing and wait times establish the priority of stations for access to the data net. The higher echelons require higher priority (lower delay times) with net control station possessing the highest. Priority is further defined by the station's importance in the tactical environment.

(1) All devices except BCT and IFSAS LCU use one delay setting for all priority messages.

(2) BCT and IFSAS LCU use 4 settings corresponding to first and subsequent transmission attempts for messages of priority 1 through 4 or 5 through 8. This allows the builder of the net to assign a longer delay to lower priority messages and to further delay subsequent (and less likely to succeed) transmissions of the same message.

(3) To establish the correct settings, assign the net access for priority 1-4 messages (for all messages in devices other than the BCT or IFSAS LCU) based on the stations echelon and tactical mission.

(a) NCS has the highest priority.

(b) Stations of the same organizational level are ordered with the next higher number.

(c) The next lower organization is assigned the next higher number. For example, if battalion FDC is the NCS on a COF net, it is assigned a priority of 1. The battalion FSCC on the net is assigned 2, and the battery FDC 3.

(d) For BCTs and IFSAS LCUs, increase the value for subsequent transmissions by at least one. Make the first transmission of priority 5-8 messages equal to or one greater than priority 1-4 subsequent transmissions. Increase the value for subsequent transmissions by at least one.

c. Data Rate

All data communications devices are capable of transmitting data at specified rates measured in bits per second (bps). All MCFSS devices are capable of 600 or 1200 bps rates. The values are proportional; e.g., 1200

bps is twice as fast as 600 bps. BCT, DMS, and LCU are capable of other rates (1200, 4800, 8000, and 16,000 bps), which are dependent upon the use of single channel ground and airborne radio system (SINCGARS) radios. The communications planner at the NCS must be aware of the capabilities of the different devices and ensure that rates selected are compatible with devices assigned to the nets.

d. Tone Pairs

MCFSS devices transmit the data signals using a form of tone modulation called audio frequency shift keying (commonly called FSK) for the 600 and 1200 bps rates. SINCGARS rates use digital transmissions as well as FSK. The tone pairs used are either 1200/2400 hertz (Hz) or 1300/2100 Hz. The MDS and Q-36 are capable of 1200/2400 Hz only. When using VRC-12 series radios, the 1300/2100 Hz is the better selection for use with KY-57 encryption. However, 1200/2400 Hz provides better communications with SINCGARS radios.

e. Keytime

Keytime is the duration, in seconds, of the signal transmitted by the data device to power the radio to transmission level. Keytime is a requirement of the radio and is lengthened by adding additional communications devices; e.g., AN/GRA-39 remotes. In most computer devices the keytime also sets the duration of the time the device waits for a control message (**ACK** or **NAK**) before giving up the attempt as failed. The communication planner must determine the keytime required by the device with the longest keytime on the net and assign that to all devices on the net.

(1) Starting keytimes are determined by the equipment. A rough determination rule can be used. For VRC-12 series radios use 1.4 seconds; for SINCGARS radios use 0.7 seconds. Add 0.7 seconds for each additional piece of communications equipment that must be keyed; e.g., attaching an AN/GRA-39 increases the keytime by 0.7 seconds.

(2) Assign the highest keytime predicted for any station to all stations on the net.

2004. Subscriber Tables

a. Responsible Agencies

A number of variables affect the writing of the subscriber tables. These include the number of available communications assets (e.g., radios, frequencies, and batteries), number and type of MCFSS devices, task organization, and mission. The subscriber tables must be flexible enough to allow changes during the course of operations. The agencies responsible for producing and updating the subscriber tables must be intimately familiar with these requirements. Since no single agency in the MEF is required to communicate with and possess detailed, up-to-date knowledge of the communications situation on every net, no single station is able to produce the entire subscriber table. Hence, the production and update of the subscriber tables is decentralized. Each NCS is responsible for the subscriber tables for its nets. These subscriber tables will conform to the standardized procedures listed in this paragraph.

b. Standard Addressing

NCSs conform to the system of standard addressing listed in the following figures. The addresses available are listed in the left most column. Each net is provided a column in the table with the net name in the heading. Locating the subscriber in the net column and indexing to the left yields the assigned address for any station. Blank entries for a net indicate an unassigned address available to the communications planner. The following special instructions apply to assigning addresses.

- (1) Special characters (& * + - # ? .) cannot be assigned to fixed format devices or nets on which fixed format devices must communicate.
- (2) Addresses Q through Z must be reserved for fixed format relay addresses and not assigned.
- (3) Assigning message of interest (MOI) addresses to the BCT or LCU result in fire mission messages being received in an information only mode. Do not assign MOI addresses to these devices when establishing net setting. MOI addresses must be established for BCT and LCU subscribers in the subscribers table. Use the same address as the physical address extracted from the following figures.

c. MEF FFC Net, Div FSC Net, and Regt FSC Nets

Figure 2-4 provides standard addresses for the MEF FFC Net, the Div FSC Net, and the Regt FSC Net.

| Address | MEF FFC Net | Div FSC Net | Regt FSC Net |
|----------------|--------------------------|--------------------|-------------------------|
| A | MEF FFCC-Main | | Regt FSCC-Main |
| B | 1st Div FSCC-Main | | Regt FSCC-Fwd |
| C | 1st Div FSCC-Fwd | | 1st Bn FSCC-Main |
| D | 2d Div FSCC-Main | | 1st Bn FSCC-Fwd |
| E | 2d Div FSCC-Fwd | | 2d Bn FSCC-Main |
| F | 3d Div FSCC-Main | | 2d Bn FSCC-Fwd |
| G | 3d Div FSCC-Fwd | | 3d Bn FSCC-Main |
| H | MEF FFCC-Fwd | | 3d Bn FSCC-Fwd |
| I | RAOC-Main | | 4th Bn FSCC-Main |
| J | RAOC-Fwd | | 4th Bn FSCC-Fwd |
| K | | | Arty Bn FDC-Main |
| L | | | Arty Bn FDC-Fwd |
| M | | | |
| N | | | |
| O | | | |
| P | | | |
| Q | | | |
| R | | | |
| S | | | |
| T | | | |
| U | | | |
| V | | | |
| W | | | |
| X | | | |
| Y | | | |
| Z | | | |

Figure 2-4. MEF FFC, Div FSC, and Regt FSC Nets Subscriber Table

| Address | MEF FFC Net | Div FSC Net | Regt FSC Net |
|---------|-------------|--------------------------------|--------------|
| 0 | | Div FSCC-Main | |
| 1 | | Div FSCC-Fwd | |
| 2 | | DASC-Main | |
| 3 | | DASC-Fwd | |
| 4 | | 1st Infantry Regt FSCC-Main | |
| 5 | | 1st Infantry Regt FSCC-Fwd | |
| 6 | | 2d Infantry Regt FSCC-Main | |
| 7 | | 2d Infantry Regt FSCC-Fwd | |
| 8 | | 3d Infantry Regt FSCC-Main | |
| 9 | | 3d Infantry Regt FSCC-Fwd | |
| * | | 4th Infantry Regt FSCC-Main | |
| ? | | 4th Infantry Regt FSCC-Fwd | |
| + | | Arty Regt FDC-Main | |
| 0 | | Arty Regt FDC-Fwd | |
| - | | | |
| # | | | |
| & | | | |

Figure 2-4 (continued). MEF FFC, Div FSC, and Regt FSC Nets Subscriber Table

NOTE: A forward echelon (e.g., "Arty Regt FDC-Fwd") is formed from the equipment and staff of a unit's main echelon to enable it to displace in two increments and thus maintain continuous control of combat operations. The forward echelon should not be confused with the tactical echelon. For more information on command echelonment, see page 21 of FMFM 3, *Command Control*, and pages 1-5 and 9-3 of FMFM 6-9, *Marine Artillery Support*.

d. Regt FD Net, TPC Wire Net, and Met/Rdr Tel Net

Figure 2-5 lists the standard addresses for the Regt FD Net, TPC Wire Net, and Met/Rdr Tel Net. The addresses are laid to allow the Div FSC Net to be combined with the Regt FD Net.

| Address | Regt FD Net | TPC Wire Net | Met/Rdr Tel Net |
|---------|----------------------|--------------------|-----------------|
| A | Arty Regt FDC Main | Arty Regt FDC Main | |
| B | Arty Regt FDC Fwd | Arty Regt FDC Fwd | |
| C | 1st Arty Bn FDC Main | | |
| D | 1st Arty Bn FDC Fwd | | |
| E | 2d Arty Bn FDC-Main | | |
| F | 2d Arty Bn FDC-Fwd | | |
| G | 3d Arty Bn FDC-Main | | |
| H | 3d Arty Bn FDC-Fwd | | |
| I | 4th Arty Bn FDC-Main | | |
| J | 4th Arty Bn FDC-Fwd | TPC-Main | TPC-Main |
| K | 5th Arty Bn FDC-Main | TPC-Fwd | TPC-Fwd |
| L | 5th Arty Bn FDC-Fwd | | CBR #1 |
| M | MLRS Bn/Btry-Main | | CBR #2 |
| N | MLRS Bn/Btry-Fwd | | CBR #3 |
| O | | | CBR #4 |
| P | | | CBR #5 |
| Q | | | |
| R | | | |
| S | | | |
| T | | | |
| U | | | |
| V | | | |
| W | | | |

Figure 2-5. Regt FD, TPC Wire, and Met/RdrTel Nets Subscriber Table

| Address | Regt FD Net | TPC Wire Net | Met/Rdr Tel Net |
|----------------|--------------------|---------------------|------------------------|
| X | | | |
| Y | | | |
| Z | | | |
| 0 | | | |
| 1 | | | MDS #1 |
| 2 | | | MDS #2 |
| 3 | | | MDS #3 |
| 4 | | | MDS #4 |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| * | | | |
| ? | | | |
| + | | | |
| 0 | | | |
| - | | | |
| # | | | |
| & | | | |

Figure 2-5 (continued). Regt FD, TPC Wire, and Met/Rdr Tel Nets Subscriber Table

e. Bn COF Nets

Figure 2-6 contains the standard addresses used on the COF nets at the artillery battalion. Four COF nets are provided. COF 1 and 2 may be combined to form a single COF A. COF 3 and 4 may be combined to form a single COF B.

| Address | COF 1 | COF 2 | COF 3 | COF 4 |
|---------|-----------------------------|--------------------|----------------------------|---------------------|
| A | Bn FDC-Main | Bn FDC-Main | Bn FDC-Main | Bn FDC-Main |
| B | Bn FDC-Fwd | Bn FDC-Fwd | Bn FDC-Fwd | Bn FDC-Fwd |
| C | 1st Bn FSCC-Main | | 3d Bn FSCC-Main | |
| D | 1st Bn FSCC-Fwd | | 3d Bn FSCC-Fwd | |
| E | 1st Company FO | | 1st Company FO | |
| F | 2d Company FO | | 2d Company FO | |
| G | 3d Company FO | | 3d Company FO | |
| H | 4th Company FO | | 4th Company FO | |
| I | 1st Battery FDC- 1st BCS | | 3d Battery FDC- 1st BCS | |
| J | 1st Battery FDC- 2d BCS | | 3d Battery FDC- 2d BCS | |
| K | | 2d Bn FSCC-Main | | 4th Bn FSCC-Main |
| L | | 2d Bn FSCC-Fwd | | 4th Bn FSCC-Fwd |
| M | | 1st Company FO | | 1st Company FO |
| N | | 2d Company FO | | 2d Company FO |
| O | | 3d Company FO | | 3d Company FO |
| P | | 4th Company FO | | 4th Company FO |
| Q | | | | |
| R | | | | |

Figure 2-6. COF Nets Subscriber Table

| Address | COF 1 | COF 2 | COF 3 | COF 4 |
|----------------|--------------|-------------------------------|--------------|--------------------------------|
| S | | | | |
| T | | | | |
| U | | | | |
| V | | | | |
| W | | | | |
| X | | | | |
| Y | | | | |
| Z | | | | |
| 0 | | 2d Battery FDC-1st BCS | | 4th Battery FDC-1st BCS |
| 1 | | 2d Battery FDC-2d BCS | | 4th Battery FDC-2d BCS |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| * | | | | |
| ? | | | | |
| + | | | | |
| 0 | | | | |
| - | | | | |
| # | | | | |
| & | | | | |

Figure 2-6 (continued). COF Nets Subscriber Table

f. Subscriber Identification Codes

Subscriber identification (SID) codes must be unique for each subscriber and mirror those at the subscriber's device. Figures 2-7 through 2-16 provide unique subscriber identification codes for each subscriber by net. To determine the correct SID code, enter the table with the station, cross index with the subscriber, and extract the SID code to assign to that subscriber.

| THEM | YOU | | | | | | | | | |
|--------------|-------------|------------|--------------------|-------------------|-------------------|------------------|-------------------|------------------|--------------------|-------------------|
| | MEF MAIN | MEF FWD | 1ST DIV MAIN | 1ST DIV FWD | 2D DIV MAIN | 2D DIV FWD | 3D DIV MAIN | 3D DIV FWD | 4TH DIV MAIN | 4TH DIV FWD |
| MEF MAIN | | M4/4M | M5/5M | M6/6M | M7/7M | M8/8M | M9/9M | M0/0M | N1/1N | N2/2N |
| MEF FWD | 4M/M4 | | N3/3N | N4/4N | N5/5N | N6/6N | N7/7N | N8/8N | N9/9N | N0/0N |
| 1ST DIV MAIN | 5M/M5 | 3N/N3 | | TF/FT | UF/FU | VF/FV | HG/GH | IG/GI | JG/GJ | KG/GK |
| 1ST DIV FWD | 6M/M6 | 4N/N4 | FT/TF | | LG/GL | MG/GM | NG/GN | OG/GO | PG/GP | QG/GQ |
| 2D DIV MAIN | 7M/M7 | 5N/N5 | FU/UF | GL/LG | | RG/GR | SG/GS | TG/GT | UG/GU | VG/GV |
| 2D DIV FWD | 8M/M8 | 6N/N6 | FV/VF | GM/MG | GR/RG | | IH/HI | JH/HJ | KH/HK | LH/HL |
| 3D DIV MAIN | 9M/M9 | 7N/N7 | GH/HG | GN/NG | GS/SG | HI/IH | | MH/HM | NH/HN | OH/HO |
| 3D DIV FWD | 0M/M0 | 8N/N8 | GI/IG | GO/OG | GT/TG | HJ/JH | HMMH | | PH/HP | QH/HQ |
| 4TH DIV MAIN | 1N/N1 | 9N/N9 | GJ/JG | GP/PG | GU/UG | HK/KH | HN/NH | HP/PH | | RH/HR |
| 4TH DIV FWD | 2N/N2 | 0N/N0 | GK/KG | GQ/QG | GV/VG | HL/LH | HO/OH | HQ/QH | HR/RH | |

Figure 2-7. MEF FFC Net SID Codes

| THEM | YOU | | | | | | | | | | | | | |
|----------------|----------|---------|---------------|--------------|--------------|-------------|--------------|-------------|---------------|--------------|----------------|---------------|-----------|----------|
| | DIV MAIN | DIV FWD | 1ST REGT MAIN | 1ST REGT FWD | 2D REGT MAIN | 2D REGT FWD | 3D REGT MAIN | 3D REGT FWD | 4TH REGT MAIN | 4TH REGT FWD | ARTY REGT MAIN | ARTY REGT FWD | DASC MAIN | DASC FWD |
| DIV MAIN | | 0C/C0 | 1D/D1 | 2D/D2 | 3D/D3 | 4D/D4 | 5D/D5 | 6D/D6 | SE/ES | KF/FK | 9C/Q9 | 9R/R9 | 0S/S0 | 2U/U2 |
| DIV FWD | 0C/C0 | | 7D/D7 | 8D/D8 | 9D/D9 | 0D/D0 | 1E/E1 | 2E/E2 | TE/ET | LF/FL | 0Q/Q0 | 0R/R0 | 1T/T1 | 3U/U3 |
| 1ST REGT MAIN | D1/D1 | D7/D7 | | 3E/E3 | 4E/E4 | 5E/E5 | 6E/E6 | 7E/E7 | UE/EU | FM/MF | 1R/R1 | 1S/S1 | 2T/T2 | 4U/U4 |
| 1ST REGT FWD | D2/D2 | D8/D8 | E3/E3 | | 8E/E8 | 9E/E9 | 0E/E0 | 1F/F1 | VE/EV | NF/FN | 2R/R2 | 2S/S2 | 3T/T3 | 5U/U5 |
| 2D REGT MAIN | D3/D3 | D9/D9 | E4/E4 | E8/E8 | | 2F/F2 | 3F/F3 | 4F/F4 | GF/FG | OF/FO | 3R/R3 | 3S/S3 | 4T/T4 | 6U/U6 |
| 2D REGT FWD | D4/D4 | D0/D0 | E5/E5 | E9/E9 | F2/F2 | | 5F/F5 | 6F/F6 | HF/FH | PF/FP | 4R/R4 | 4S/S4 | 5T/T5 | 7U/U7 |
| 3D REGT MAIN | D5/D5 | E1/E1 | E6/E6 | E0/E0 | F3/F3 | F5/F5 | | 7F/F7 | IF/IF | QF/FQ | 5R/R5 | 5S/S5 | 6T/T6 | 8U/U8 |
| 3D REGT FWD | D6/D6 | E2/E2 | E7/E7 | F1/F1 | F4/F4 | F6/F6 | F7/F7 | | JF/FJ | RF/RF | 6R/R6 | 6S/S6 | 7T/T7 | 9U/U9 |
| 4TH REGT MAIN | ES/SE | ET/TE | EU/UE | EV/VE | FG/GF | FH/HF | FJ/JF | | | SF/FS | 7R/R7 | 7S/S7 | 8T/T8 | 0U/U0 |
| 4TH REGT FWD | FK/KF | FL/LF | FM/MF | FN/NF | FO/OF | FP/FP | FQ/QF | FR/RF | FS/SF | | 8R/R8 | 8S/S8 | 9T/T9 | 1V/V1 |
| ARTY REGT MAIN | Q9/Q9 | Q0/Q0 | R1/R1 | R2/R2 | R3/R3 | R4/R4 | R5/R5 | R6/R6 | R7/R7 | R8/R8 | | 9S/S9 | 0T/T0 | 2V/V2 |
| ARTY REGT FWD | R9/R9 | RO/OR | S1/S1 | S2/S2 | S3/S3 | S4/S4 | S5/S5 | S6/S6 | S7/S7 | S8/S8 | S9/S9 | | 1U/U1 | 3V/V3 |
| DASC MAIN | S0/S0 | T1/T1 | T2/T2 | T3/T3 | T4/T4 | T5/T5 | T6/T6 | T7/T7 | T8/T8 | T9/T9 | T0/T0 | U1/U1 | | 4V/V4 |
| DASC FWD | U2/U2 | U3/U3 | U4/U4 | U5/U5 | U6/U6 | U7/U7 | U8/U8 | U9/U9 | U0/U0 | V1/V1 | V2/V2 | V3/V3 | V4/V4 | |

Figure 2-8. Div FSC Net SID Codes

| THEM | YOU | | | | | | | | | | | | | |
|-----------------|---------------|--------------|-----------------|----------------|----------------|---------------|----------------|---------------|-----------------|----------------|-----------------|----------------|---------------|--------------|
| | REGT FDC MAIN | REGT FDC FWD | 1ST BN FDC MAIN | 1ST BN FDC FWD | 2D BN FDC MAIN | 2D BN FDC FWD | 3D BN FDC MAIN | 3D BN FDC FWD | 4TH BN FDC MAIN | 4TH BN FDC FWD | 5TH BN FDC MAIN | 5TH BN FDC FWD | MLRS FDC MAIN | MLRS FDC FWD |
| REGT FDC MAIN | | BB/AA | DD/CC | FF/EE | HH/GG | JJ/II | LL/KK | ES/MM | PP/OO | 00/99 | TF/FT | UF/FU | VF/FV | HG/GH |
| REGT FDC FWD | AA/BB | | RR/QQ | TT/SS | VV/UU | 22/11 | 44/33 | 66/55 | 88/77 | 1A/A1 | IG/GI | JG/GJ | KG/GK | LG/GL |
| 1ST BN FDC MAIN | CC/DD | QQ/RR | | 2A/A2 | 3A/A3 | 4A/A4 | 5A/A5 | 6A/A6 | 7A/A7 | 8A/A8 | MG/GM | NG/GN | OG/GO | PG/GP |
| 1ST BN FDC FWD | EE/FF | SS/TT | A2/A2 | | 9A/A9 | 0A/A0 | 1B/B1 | 2B/B2 | 3B/B3 | 4B/B4 | QG/GQ | RG/GR | SG/GS | TG/GT |
| 2D BN FDC MAIN | GG/HH | UU/VV | A3/A3 | A9/A9 | | 5B/B5 | 6B/B6 | 7B/B7 | 8B/B8 | 9B/B9 | UG/GU | VG/GV | IH/HI | JH/HJ |
| 2D BN FDC FWD | II/JJ | 11/22 | A4/A4 | A0/A0 | B5/B5 | | 0B/B0 | 1C/C1 | 2C/C2 | 3C/C3 | KH/HK | LH/HL | MH/HM | NH/HN |
| 3D BN FDC MAIN | KK/LL | 33/44 | A5/A5 | B1/B1 | B6/B6 | B0/B0 | | 4C/C4 | 5C/C5 | 6C/C6 | OH/HO | PH/HP | QH/HQ | RH/HR |
| 3D BN FDC FWD | MM/ES | 55/66 | A6/A6 | B2/B2 | B7/B7 | C1/C1 | C4/C4 | | 7C/C7 | 8C/C8 | SH/HS | TH/HT | UH/HU | VH/HV |
| 4TH BN FDC MAIN | OO/PP | 77/88 | A7/A7 | B3/B3 | B8/B8 | C2/C2 | C5/C5 | C7/C7 | | 9C/C9 | JJ/IJ | IK/KI | LI/LI | MJ/MI |
| 4TH BN FDC FWD | 99/00 | A11/A1 | A8/A8 | B4/B4 | B9/B9 | C3/C3 | C6/C6 | C8/C8 | C9/C9 | | NI/IN | OI/OI | PI/IP | QI/IQ |
| 4TH BN FDC MAIN | FT/TF | GJ/JG | GM/MG | GQ/QG | GU/UG | HK/KH | HO/OH | HS/SH | IJ/JI | IN/NI | | RJ/RJ | SI/SI | TJ/IT |
| 4TH BN FDC FWD | FU/UF | GJ/JG | GN/NG | GR/RG | GV/VG | HL/LH | HP/PH | HT/TH | IK/KI | IO/OI | IR/RI | | US/SU | VI/IV |
| MLRS FDC MAIN | FV/VF | GK/KG | GO/OG | GS/SG | HI/IH | HM/MH | HQ/QH | HU/UH | IL/LI | IP/PI | IS/SI | IU/UI | | KJ/JK |
| MLRS FDC FWD | GH/HG | GU/LG | GP/PG | GT/TG | HJ/JH | HN/NH | HR/RH | HV/VH | IM/MI | IQ/QI | IT/TI | IV/VI | JK/KJ | |

Figure 2-9. Regt FD Net SID Codes

| THEM | YOU | | | | | | | | | | | |
|------------------|----------------|---------------|------------------|-----------------|------------------|-----------------|-----------------|----------------|-----------------|----------------|------------------|-----------------|
| | REGT FSCC MAIN | REGT FSCC FWD | ARTY BN FDC MAIN | ARTY BN FDC FWD | 1ST BN FSCC MAIN | 1ST BN FSCC FWD | 2D BN FSCC MAIN | 2D BN FSCC FWD | 3D BN FSCC MAIN | 3D BN FSCC FWD | 4TH BN FSCC MAIN | 4TH BN FSCC FWD |
| REGT FSCC MAIN | | 8F/8F | 9F/F9 | 0F/F0 | 1G/G1 | 2G/G2 | 3G/G3 | 4G/G4 | 5G/G5 | 6G/G6 | 7G/G7 | 8G/G8 |
| REGT FSCC FWD | F8/8F | | 9G/G9 | 0G/G0 | 1H/H1 | 2H/H2 | 3H/H3 | 4H/H4 | 5H/H5 | 6H/H6 | 7H/H7 | 8H/H8 |
| ARTY BN FDC MAIN | F9/9F | G9/9G | | 9H/H9 | 0H/H0 | 1I/I1 | 2I/I2 | 3I/I3 | 4I/I4 | 5I/I5 | 6I/I6 | 7I/I7 |
| ARTY BN FDC FWD | F0/0F | G0/0G | H9/9H | | 8I/I8 | 9I/I9 | 0I/I0 | 1J/J1 | 2J/J2 | 3J/J3 | 4J/J4 | 5J/J5 |
| 1ST BN FSCC MAIN | G1/1G | H1/1H | H0/0H | I8/8I | | 6J/J6 | 7J/J7 | 8J/J8 | 9J/J9 | 0J/J0 | 1K/K1 | 2K/K2 |
| 1ST BN FSCC FWD | G2/2G | H2/2H | I1/1I | I9/9I | J6/6J | | 3K/K3 | 4K/K4 | 5K/K5 | 6K/K6 | 7K/K7 | 8K/K8 |
| 2D BN FSCC MAIN | G3/3G | H3/3H | I2/2I | I0/0I | J7/7J | K3/3K | | 9K/K9 | 0K/K0 | 1L/L1 | 2L/L2 | 3L/L3 |
| 2D BN FSCC FWD | G4/4G | H4/4H | I3/3I | J1/1J | J8/8J | K4/4K | K9/9K | | 4L/L4 | 5L/L5 | 6L/L6 | 7L/L7 |
| 3D BN FSCC MAIN | G5/5G | H5/5H | I4/4I | J2/2J | J9/9J | K5/5K | K0/0K | L4/4L | | 8L/L8 | 9L/L9 | 0L/L0 |
| 3D BN FSCC FWD | G6/6G | H6/6H | I5/5I | J3/3J | J0/0J | K6/6K | L1/1L | L5/5L | L8/8L | | 1M/M1 | 2M/M2 |
| 4TH BN FSCC MAIN | G7/7G | H7/7H | I6/6I | J4/4J | K1/1K | K7/7K | L2/2L | L6/6L | L9/9L | M1/1M | | 3M/M3 |
| 4TH BN FSCC FWD | G8/8G | H8/8H | I7/7I | J5/5J | K2/2K | K8/8K | L3/3L | L7/7L | L0/0L | M2/2M | M3/3M | |

Figure 2-10. Regt FSC Net SID Codes

| THEM | YOU | | | | | | | | | | |
|-----------------------|------------------|-----------------|------------------|-----------------|-----------------------|----------------------|-------|-------|-------|-------|--|
| | ARTY BN FDC MAIN | ARTY BN FDC FWD | 1ST BN FSCC MAIN | 1ST BN FSCC FWD | 1ST BTRY FDC, 1ST BCS | 1ST BTRY FDC, 2D BCS | FO1 | FO2 | FO3 | FO4 | |
| ARTY BN FDC MAIN | | 4M/M4 | 5M/M6 | 6M/M6 | 7M/M7 | 8M/M8 | 9M/M9 | 0M/M0 | 1N/N1 | 2N/N2 | |
| ARTY BN FDC FWD | M4/4M | | 3N/N3 | 4N/N4 | 5N/N5 | 6N/N6 | 7N/N7 | 8N/N8 | 9N/N9 | 0N/N0 | |
| 1ST BN FSCC MAIN | M5/5M | N3/3N | | 1O/O1 | 2O/O2 | 3O/O3 | 4O/O4 | 5O/O5 | 6O/O6 | 7O/O7 | |
| 1ST BN FSCC FWD | M6/6M | N4/4N | O1/1O | | 8O/O8 | 9O/O9 | 0O/O0 | 1P/P1 | 2P/P2 | 3P/P3 | |
| 1ST BTRY FDC, 1ST BCS | M7/7M | N5/5N | O2/2O | O8/8O | | 4P/P4 | 5P/P5 | 6P/P6 | 7P/P7 | 8P/P8 | |
| 1ST BTRY FDC, 2D BCS | M8/8M | N6/6N | O3/3O | O9/9O | P4/4P | | 9P/P9 | 0P/P0 | 1Q/Q1 | 2Q/Q2 | |
| FO1 | M9/9M | N7/7N | O4/4O | O0/0O | P5/5P | P8/8P | | 3Q/Q3 | 4Q/Q4 | 5Q/Q5 | |
| FO2 | M0/0M | N8/8N | O5/5O | P1/1P | P6/6P | P0/0P | Q3/3Q | | 6Q/Q6 | 7Q/Q7 | |
| FO3 | N1/1N | N9/9N | O6/6O | P2/2P | P7/7P | Q1/1Q | Q4/4Q | Q6/6Q | | 8Q/Q8 | |
| FO4 | N2/2N | N0/0N | O7/7O | P3/3P | P8/8P | Q2/2Q | Q5/5Q | Q7/7Q | Q8/8Q | | |

Figure 2-11. COF 1 SID Codes

| THEM | YOU | | | | | | | | | |
|----------------------|------------------|-----------------|-----------------|----------------|----------------------|---------------------|-------|-------|-------|-------|
| | ARTY BN FDC MAIN | ARTY BN FDC FWD | 2D BN FSCC MAIN | 2D BN FSCC FWD | 2D BTRY FDC, 1ST BCS | 2D BTRY FDC, 2D BCS | FO5 | FO6 | FO7 | FO8 |
| ARTY BN FDC MAIN | 9Q/Q9 | 0Q/Q0 | 1R/R1 | 2R/R2 | 3R/R3 | 4R/R4 | 5R/R5 | 6R/R6 | 7R/R7 | |
| ARTY BN FDC FWD | Q9/Q9 | | 8R/R8 | 9R/R9 | 0R/R0 | 1S/S1 | 2S/S2 | 3S/S3 | 4S/S4 | 5S/S5 |
| 2D BN FSCC MAIN | Q0/Q0 | R8/R8 | | 6S/S6 | 7S/S7 | 8S/S8 | 9S/S9 | 0S/S0 | 1T/T1 | 2T/T2 |
| 2D BN FSCC FWD | R1/R1 | R9/R9 | S6/S6 | | 3T/T3 | 4T/T4 | 5T/T5 | 6T/T6 | 7T/T7 | 8T/T8 |
| 2D BTRY FDC, 1ST BCS | R2/R2 | R0/R0 | S7/S7 | T3/T3 | | 9T/T9 | 0T/T0 | 1U/U1 | 2U/U2 | 3U/U3 |
| 2D BTRY FDC, 2D BCS | R3/R3 | S1/S1 | S8/S8 | T4/T4 | T9/T9 | | 4U/U4 | 5U/U5 | 6U/U6 | 7U/U7 |
| FO5 | R4/R4 | S2/S2 | S9/S9 | T5/T5 | T0/T0 | U4/U4 | | 8U/U8 | 9U/U9 | 0U/U0 |
| FO6 | R5/R5 | S3/S3 | S0/S0 | T6/T6 | U1/U1 | U5/U5 | U8/U8 | | 1V/V1 | 2V/V2 |
| FO7 | R6/R6 | S4/S4 | T1/T1 | T7/T7 | U2/U2 | U6/U6 | U9/U9 | V1/V1 | | 3V/V3 |
| FO8 | R7/R7 | S5/S5 | T2/T2 | T8/T8 | U3/U3 | U7/U7 | U0/U0 | V2/V2 | V3/V3 | |

Figure 2-12. COF 2 SID Codes

| THEM | YOU | | | | | | | | | |
|----------------------|------------------|-----------------|-----------------|----------------|----------------------|---------------------|-------|-------|-------|-------|
| | ARTY BN FDC MAIN | ARTY BN FDC FWD | 3D BN FSCC MAIN | 3D BN FSCC FWD | 3D BTRY FDC, 1ST BCS | 3D BTRY FDC, 2D BCS | FO9 | FO10 | FO11 | FO12 |
| ARTY BN FDC MAIN | 4V/V4 | 5V/V5 | 6V/V6 | 7V/V7 | 8V/V8 | 9V/V9 | V0/V0 | BA/AB | CA/AC | |
| ARTY BN FDC FWD | V4/V4 | | DA/AD | EJ/AE | FA/AF | GA/AG | HA/AH | IA/AI | JA/AJ | KA/AK |
| 3D BN FSCC MAIN | V5/V5 | AD/DA | | LA/JA | MA/AM | NA/AN | OA/AO | PA/AP | QA/AQ | RA/AR |
| 3D BN FSCC FWD | V8/V8 | AE/EA | AL/LA | | SA/AS | TA/AT | UA/AU | VA/AV | CB/BC | DB/BD |
| 3D BTRY FDC, 1ST BCS | V7/V7 | AF/FA | AM/MA | AS/SA | | EB/BE | FB/BF | GB/BG | HB/BH | IB/BI |
| 3D BTRY FDC, 2D BCS | V8/V8 | AG/GA | AN/NA | AT/TA | BE/EB | | JB/BJ | KB/BK | LB/BL | MB/BM |
| FO9 | V9/V9 | AH/HA | AO/OA | AU/UA | BF/FB | BJ/BJ | | NB/BN | OB/BO | PB/BP |
| FO10 | V0/V0 | AI/IA | AP/PA | AV/VA | BG/GB | BK/KB | BN/NB | | QB/BQ | RB/BR |
| FO11 | AB/BA | AJ/JA | AQ/QA | BC/CB | BH/HB | BL/LB | BO/OB | BQ/QB | | SB/BS |
| FO12 | AC/CA | AK/KA | AR/RA | BD/DB | BI/IB | BM/MB | BP/PB | BR/RB | BS/SB | |

Figure 2-13. COF 3 SID Codes

| THEM | YOU | | | | | | | | | |
|-----------------------|------------------|-----------------|------------------|-----------------|-----------------------|----------------------|-------|-------|-------|------|
| | ARTY BN FDC MAIN | ARTY BN FDC FWD | 4TH BN FSCC MAIN | 4TH BN FSCC FWD | 4TH BTRY FDC, 1ST BCS | 4TH BTRY FDC, 2D BCS | FO13 | FO14 | FO15 | FO16 |
| ARTY BN FDC MAIN | TB/BT | UB/BU | VB/BV | DC/CD | EC/CE | FC/CF | GC/CG | HC/CH | IC/CI | |
| ARTY BN FDC FWD | BT/TB | KC/CK | LC/CL | MC/CM | NC/CN | OC/CO | PC/CP | QC/CQ | RC/CR | |
| 4TH BN FSCC MAIN | BU/UB | CK/KC | SC/CS | TC/CT | UC/CU | VC/CV | ED/DE | FD/DF | GD/DG | |
| 4TH BN FSCC FWD | BV/VB | CL/LC | CS/SC | HD/DH | ID/DI | JD/DJ | KD/DK | LD/DL | MD/DM | |
| 4TH BTRY FDC, 1ST BCS | CD/DC | CM/MC | CT/TC | DH/HD | ND/DN | OD/DO | PD/DP | QD/DQ | RD/DR | |
| 4TH BTRY FDC, 2D BCS | CE/EC | CN/NC | CU/UC | DI/ID | DN/ND | SD/DS | TD/DT | UD/DU | VD/DV | |
| FO13 | CF/FC | CO/OC | CV/VC | DJ/JD | DO/OD | DS/SD | FE/EF | GE/EG | HE/EH | |
| FO14 | CG/GC | CP/PC | DE/ED | DK/KD | DP/PD | DT/TD | EF/FE | IE/EI | JE/EJ | |
| FO15 | CH/HC | CQ/QC | DF/FD | DL/LD | DQ/QD | DU/UD | EG/GE | EI/IE | KE/EK | |
| FO16 | CI/IC | CR/RC | DG/GD | DM/MD | DR/RD | DV/VD | EH/HE | EJ/JE | EK/KE | |

Figure 2-14. COF 4 SID Codes

| THEM | YOU | | | |
|--------------------|----------|---------|--------------------|-------------------|
| | TPC MAIN | TPC FWD | ARTY REGT FDC MAIN | ARTY REGT FDC FWD |
| TPC MAIN | LE/EL | ME/EM | OE/EO | |
| TPC FWD | EL/LE | PE/EP | QE/EQ | |
| ARTY REGT FDC MAIN | EM/ME | EPI/PE | RE/ER | |
| ARTY REGT FDC FWD | EO/OE | EQ/QE | ER/RE | |

Figure 2-15. TPC Wire Net SID Codes

| THEM | YOU | |
|----------|----------|---------|
| | TPC MAIN | TPC FWD |
| TPC MAIN | SE/ES | |
| TPC FWD | ES/SE | |
| CBR1 | ET/TE | FL/LF |
| CBR2 | EU/UE | FM/MF |
| CBR3 | EV/VE | FN/NF |
| CBR4 | FG/GF | FO/OF |
| CBR5 | JL/LJ | LJ/JL |
| MDS1 | FH/HF | FP/PF |
| MDS2 | FI/IF | FQ/QF |
| MDS3 | FJ/JF | FR/RF |
| MDS4 | FK/KF | FS/SF |

Figure 2-16. Met/Rdr Tel Net Codes

g. Logical Names

Logical names must be identical in both the transmitting and the receiving variable format devices. Logical names are composed of five subfields. The first three subfields may contain only one character. The fourth subfield may contain one or two characters. The fifth subfield may contain up to three characters. The following logical name formats are established to ensure uniformity:

(1) Units (e.g., 1st Section, 2d Platoon, Company C, 1st Battalion, 23d Marines is **1/2/C/1_/23**)

- [1] Section numerical designation
- [2] Platoon numerical designation
- [3] Battery or company letter designation
- [4] Battalion numerical designation
- [5] Regiment or brigade numerical designation

(2) Battalion FSCC Main (e.g., 1st Battalion, 4th Marines FSCC is **F/S/C/1_/4__**)

- [1] F
- [2] S
- [3] C
- [4] Battalion numerical designation
- [5] Regiment or brigade numerical designation

(3) Battalion FSCC Forward (e.g., 1st Battalion, 4th Marines FSCC forward is **F/W/D/1_/4__**)

- [1] F
- [2] W
- [3] D
- [4] Battalion numerical designation
- [5] Regiment or brigade tag

(4) Task Force FSCC Main (e.g., Task Force Hill FSCC is **T/F/H/1_/MN_**)

- [1] T
- [2] F
- [3] First letter of task force name
- [4] Sequential number of task force
- [5] MN

(5) Task Force FSCC Forward (e.g., Task Force Ripper FSCC Forward is T/F/R/2_/FWD)

- [1] T
- [2] F
- [3] First letter of task force name
- [4] Sequential number of task force
- [5] FWD

(6) Regimental FSCC Main (e.g., 4th Marines FSCC is F/S/C/4_/MR_)

- [1] F
- [2] S
- [3] C
- [4] Regiment numerical designation
- [5] MR

(7) Regimental FSCC Forward (e.g., 4th Marines FSCC forward is F/W/D/4_/MAR)

- [1] F
- [2] W
- [3] D
- [4] Regiment numerical designation
- [5] MAR

(8) Division FSCC Main (e.g., 1st Marine Division FSCC is F/S/C/1_/MD_)

- [1] F
- [2] S
- [3] C
- [4] Division numerical designation
- [5] MD

(9) Division FSCC Forward (e.g., 1st Marine Division FSCC forward is F/W/D/1_/DIV)

- [1] F
- [2] W
- [3] D
- [4] Division numerical designation
- [5] DIV

(10) DASC Main (e.g., DASC supporting 1st Marine Division is D/A/S/1_/AW_)

- [1] D
- [2] A
- [3] S
- [4] Numerical designation of GCE supported
- [5] AW

(11) DASC Forward (e.g., DASC supporting 1st Marine Division forward is D/A/S/1_/FWD)

- [1] D
- [2] A
- [3] S
- [4] Numerical designation of GCE supported
- [5] FWD

(12) MEF FFCC Main (e.g., II MEF FFCC is F/F/C/2_/MF_)

- [1] F
- [2] F
- [3] C
- [4] MEF numerical designation
- [5] MF

(13) MEF FFCC Forward (e.g., II MEF FFCC forward is F/W/D/2_/MEF)

- [1] F
- [2] W
- [3] D
- [4] MEF numerical designation
- [5] MEF

(14) MEF(F) FFCC Main (e.g., III MEF(F) FFCC is F/F/C/3_/FF)

- [1] F
- [2] F
- [3] C
- [4] MEF(F) numerical designation
- [5] FF

(15) MEF(F) FFCC Forward (e.g., III MEF(F) FFCC forward is F/W/D/3_/MFF)

- [1] F
- [2] W
- [3] D
- [4] MEF numerical designation
- [5] FF

(16) MEU FFCC Main/SACC (e.g., 22d MEU FFCC is F/F/C/22/MU_)

- [1] F
- [2] F
- [3] C
- [4] MEU numerical designation
- [5] MU

(17) MEU FFCC Forward (ashore) (e.g., 22d MEU FFCC forward is F/W/D/22/MEU)

- [1] F
- [2] W
- [3] D
- [4] MEU numerical designation
- [5] MEU

(18) FOs Assigned to Infantry Companies (e.g., FO for Company A, 3d Battalion, 8th Marines is F/O/A/83/___)

- [1] F
- [2] O
- [3] Company letter designation
- [4] FO number
- [5] Blank

NOTE: FO numbers may be derived from the regiment number and company; e.g., for 5th Marines, Alfa 1/5 FO is **51**, Bravo 1/5 FO is **52**, etc. Local SOPs or operations orders may also be used to establish FO numbering procedures.

(19) FOs Assigned to Separate Battalions (e.g., FO for Company B, 2d Tank Battalion is **F/O/B/51/TNK**)

- [1] F
- [2] O
- [3] Company
- [4] FO number
- [5] Three letters for battalion

NOTE: Assign FO numbers from unused numbers in MEF; e.g., in II MEF, use **4_** for light armored reconnaissance (LAR) battalion, **5_** for tank battalion, **9_** for assault amphibious vehicle (AAV) battalion. Local SOPs or operations orders may also be used to establish FO numbering procedures. The battalion subfield will use **TNK** for tank battalion, **LAR** for LAR battalion, **AAV** for AAV battalion.

(20) Firing Battery FDC (e.g., Battery G, 3d Battalion, 10th Marines FDC is **_/_/G/3_/10_**)

- [1] Blank
- [2] Blank or **2** to indicate battery operations center (BOC)
- [3] Firing battery letter designation
- [4] Artillery battalion numerical designation
- [5] Artillery regiment or brigade numerical designation

(21) Artillery Battalion FDC (e.g., 3d Battalion, 11th Marines FDC is **_/_/_/3_/11_**)

- [1] Blank
- [2] Blank
- [3] Blank
- [4] Artillery battalion numerical designation
- [5] Artillery regiment or brigade numerical designation

NOTE: During displacement of the battalion FDC, the forward echelon is indicated by **F**, **W**, and **D** in the first three subfields.

(22) **Regimental FDC** (e.g., 14th Marines FDC is / / /14/MR)

- [1] Blank
- [2] Blank
- [3] Blank
- [4] Artillery regiment numerical designation
- [5] MR

NOTE: During displacement of the regimental FDC, the forward echelon is indicated by **F**, **W**, and **D** in the first three subfields.

(23) **Met Stations (MDS/MMS)** (e.g., 2d Met Team is M/E/T/2/)

- [1] M
- [2] D
- [3] S
- [4] Team number
- [5] Blank

(24) **Radars** (e.g., 3d Radar Section is C/B/R/03/)

- [1] C
- [2] B
- [3] R
- [4] Team number
- [5] Blank

(25) **Main TPC** (e.g., 11th Marines TPC is T/P/C/11/MR)

- [1] T
- [2] P
- [3] C
- [4] Regiment numerical designation
- [5] MR

(26) **Forward TPC** (e.g., 11th Marines TPC forward is F/W/D/11/TPC)

- [1] F
- [2] W
- [3] D
- [4] Regiment numerical designation
- [5] TPC

(27) Mortar Platoons (e.g., 3d Battalion, 24th Marines 81 mm Mortar Platoon is **8/1/M/3_/24_**)

- [1] 8
- [2] 1
- [3] M
- [4] Battalion numerical designation
- [5] Regiment numerical designation

(28) Naval Surface Fire Support (NSFS) Ship (e.g., USS Virginia CGN-38 is **_J5/C/54/38_**)

- [1] Blank
- [2] Weapon bore diameter in inches
- [3] **C**=Cruiser, **D**=Destroyer, **F**=Frigate
- [4] Caliber length of tube
- [5] Hull number

h. Subscriber Device Type

The device type assigned to a subscriber determines the format of transmitted messages and the routing of messages.

(1) Message Format. Digital devices are classified as either variable or fixed format.

(a) A variable format message device can reformat a message to meet the requirements of the receiving device. A variable format BCS, for example, transmits the observer location to a BCT (also a variable format message device) as a **FM;OBCO** message, but the same message is transmitted to a fixed format DMS as a string of characters that are received as an observer location message.

(b) A fixed format device transmits a string of 38 characters that are interpreted as one of a limited catalog of messages.

(c) Identifying an incorrect device type can result in messages transmitted in a form that will be received in error or not at all.

(2) Message Routing. The same device types control the routing of messages during fire mission processing.

(a) The digital message device (DMD) identifies the subscriber as an FO. This causes MCFSS computers to assign the subscriber value from the fourth subfield of the logical name as the FO originating the mission.

(b) The fire support team DMD (FISTDMD) causes MCFSS computers to expect the fire mission to pass through this agency for approval prior to arriving at the FDC. MCFSS computers will expect initial calls for fire to be transmitted from this station but will attempt to route subsequent FO;COMD messages (e.g., "ready," "shot," "rounds complete") directly to the FO.

i. Required Software Communications Parameters

Figure 2-17 lists the data required for subscriber setup by different data systems and the names of the entries by device.

| COMM PARAMETER | DEVICE | | | | | |
|------------------------|--------------------|--------------------|------------------|--------------------|---------------------|---------------------|
| | AN/GYG-1(V) BCT | AN/GYK-37 IFSAS | AN/TMQ-31 MDS | AN/TPQ-36 RADAR | AN/PSC-2A DMS | AN/GYK-37(V) BCS |
| LOGICAL NAME | NAME | NAME | NAME | NOT USED | NAME | LOGICAL NAME |
| NET | NET ID | NET ID | NOT USED | NOT USED | NOT USED | NET |
| PHYSICAL ADDRESS | ADDRESS | ADDRESS | SOURCE | DESTINATION ID | ADDRESS | ADDRESS |
| MOI ADDRESS | MOI ADDRESS | MOI ADDRESS | NOT USED | NOT USED | NOT USED | NOT USED |
| KEYTIME | KEYTIME | KEYTIME | | KEYING BLOCK | KEYTIME | PREAMBLE |
| NET ACCESS PRIORITY | NET ACCESS | NET ACCESS | | CLEAR NET DELAY | PRIORITY | DELAY |
| SID CODES | SID | SID | NOT USED | NOT USED | NOT USED | NOT USED |
| DEVICE TYPE | DEVICE | DEVICE | | TYPE | COMPUTER: YES/NO | DEVICE |
| AGENCY | AGENCY | AGENCY | NOT USED | NOT USED | NOT USED | NOT USED |
| FSK TONE PAIR | TONES | TONES | NOT USED | NOT USED | PAIR | FSK |
| BLOCK MODE | BLOCK | BLOCK | BLOCK | BLOCK | BLOCK | MODE |

Figure 2-17. Data Systems Subscriber Setup

j. Subscriber Table Format

All subscriber data is published in the standard format shown in figure 2-18 and explained below. Not every device on the net will require all the data presented; however, a common table is provided for brevity and simplicity.

| | | | | | | | | | |
|--------|---------------------|---------------------|-------------|---------|---------|----------|--------|----------|--|
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | | | | |
| 1 | ____/____/____/____ | @@@ | #_/#_/#_/#_ | @ | | | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUB | |
| 2 | @@@ | ____/____/____/____ | @@@ | @ | @ | @@@ | @@@@@ | 1 | |

Figure 2-18. Subscriber Data

(1) Line 1 Explanation. Line 1 is OWN NAME information.

- LINE #** Provides a reference for ease in identifying a line in the table. This begins the net data for the station.
- OWN NAME** The name of the station as it is entered in the net settings.
- NET** Indicates the net for which the following data is provided.
- NET ACCESS** Provides net priority values used to establish the net settings.
- PHY ADD** The character assigned as the station's address.
- MOI ADD** Left blank.

(2) Line 2 Explanation. Line 2 and subsequent lines list the subscriber data for the stations on the net.

| | |
|---------------------|---|
| LINE # | Provides a reference for the lines of subscriber data. This begins the subscriber portion of the table. |
| NET | The net on which the following subscribers communicate. |
| LOGICAL NAME | The name of the station as it is entered in the subscriber data. |
| DEVICE | The MCFSS device used by the subscriber. |
| PHY ADD | The character assigned as the subscriber's address based on paragraph 1004a. |
| MOI ADD | The same character as the PHY ADD . |
| SID CODE | The subscriber identification code assigned based on paragraph 2004b. |
| AGENCY | The type of target acquisition agency that the subscriber represents. If the subscriber is not a target acquisition agency, OTHER is used. |
| MULTISUB | For a multisubscriber group, this is a numerical entry. Each member of a given group is assigned the same number. All multisubscriber group 1 members are entered as a single multisubscriber group, etc. |

2005. Communications Etiquette

a. Entering the Net

Stations entering the net will establish voice communications on the appropriate coordination net using the communications equipment assigned for the data net (Bn FD Net [voice] for FOs, firing battery FDCs, and battalion FSCCs entering COF Nets). When satisfactory voice communications are established, the NCS directs the station to enter the

data net and send a data communications check. The subscriber station then changes frequencies from the coordination net to the data net and transmits communications check data.

b. Troubleshooting

Communications troubleshooting will be directed by the NCS on the appropriate coordination (Bn FD Net for stations on COF nets).

2006. Device-Specific Communications Entries**a. BCT/LCU Setup**

In addition to communications net settings and subscriber data, the BCT/LCU require the following file entries and modifications to exchange information between stations. This exchange is required to perform the tasks listed in later chapters of this publication.

(1) Default Subscriber. Only battalion FDCs will establish a default subscriber based on the battalion's mission.

(a) Artillery battalions with DS, GS, or GSR missions enter the regimental FDC as the default subscriber.

(b) Artillery battalions with R missions enter the reinforced battalion FDC as the default subscriber.

(2) ATI Mode. Though not a communications entry, the ATI mode governs the automatic transmission of targeting messages. The ATI mode established is dependent upon the station.

(a) MEF FFCC is operated in mode 3.

(b) Division FSCC is operated in mode 3.

(c) DASC is operated in mode 1.

(d) Regimental FSCC is operated in mode 3.

(e) Regimental FDC is operated in mode 1.

(f) TPC is operated in mode 3.

(g) Battalion FDC is operated in mode 1 with regimental FDC as the default subscriber.

(h) Battalion FSCC is operated in mode 1.

(3) Standing Requests for Information (SRIs). All SRIs are established as level 3 requests as shown below.

(a) SRIs Established at the MEF FFCC are —

For the Division FSCC

All targets short of the FSCL

(b) SRIs Established at the Division FSCC are —

For the MEF FFCC

All targets beyond the FSCL

For the DASC

All ADA/NG targets

For the Artillery Regimental FDC

All PERSONNEL/OP targets

All SUPPLY/AMMO targets

All EQUIPMENT/RADAR targets

For the Artillery Regimental TPC

All ARTY/NOT GIVEN targets

All RKTMSL/NOT GIVEN targets

All MORT/NOT GIVEN targets

For Infantry Regimental FSCCs

All targets in the regiment's zone

(c) SRIs Established at the Infantry Regimental FSCC are —

For the Maneuver Battalion FSCC

All targets in the battalion's zone

(4) Message of Interest Setup. MOI processing allows a message to be automatically transmitted to a station to which the information is pertinent. MOI processing is governed by action and direction codes.

(a) Three possible action codes are —

- | | |
|-----------------|---|
| INCOMING | Processes the message selected as an MOI when that message is received by the computer. |
| OUTGOING | Processes the selected message type when the message is transmitted from the computer. |
| BOTH | Processes the selected message type when the message is received or transmitted. |

(b) Three possible direction codes are —

- | | |
|---------------------------------------|---|
| SEND ALWAYS | Causes the MOI to be transmitted for any messages meeting the action code. |
| SEND IF FROM OBSERVERS OR ZONE | Causes the computer to only MOI the message if it originated from an associated observer or from a grid within an associated zone. Up to 12 observers and two zones may be associated with an MOI subscriber. |
| SEND IF FROM OBSERVERS | Causes the computer to only MOI the message if it originated from an associated observer. |

(c) All MOI messages provide both the action and direction codes. If required, the associated zone is that of the MOI subscriber, and associated FOs are the subordinate FOs that support that FSCC.

(d) MOIs established at the maneuver battalion FSCC are —

| <u>To the Regimental FSCC</u> | <u>To the Battalion FDC</u> |
|-----------------------------------|---------------------------------|
| FM;OBCO I/A | FM;OBCO I/A |
| ATI;CDR I/A | |
| ATI;AZR I/A | |
| ATI;SHR I/A | |
| AFU;MFR I/A | |

(e) MOIs established at artillery battalion FDCs with DS, GS, and R missions are —

| <u>To the Regimental FSCC</u> | <u>To the Battalion FDC</u> | <u>To the Battery FDC</u> |
|-----------------------------------|---------------------------------|-------------------------------|
| ATI;CDR I/A | AFU;MFR I/B | SPRT;MAP I/A |
| ATI;AZR I/A | | FM;OBCO I/A |
| ATI;SHR I/A | | SPRT;BGEOM I/A |
| ATI;CBTI I/A | | SPRT;ZONE I/A |
| ATI;SVL I/A | | MET;CM I/A |
| AFU;UPDATE I/A | | AFU;REG I/A |
| AFU;AMMO I/A | | |
| AFU;MFR I/A | | |

NOTE: For GS and GSR missions, change all MOIs (except ATI messages) listed for the infantry regimental FSCC to route to the artillery regimental FDC and change ATI messages to route to the division FSCC. For R missions, change MOIs listed for the infantry regimental FSCC to route to the reinforced artillery battalion FDC and delete AFU;UPDATE and AFU;AMMO.

(f) MOIs established at artillery battalion FDCs with GS and R missions require relay communications with the division FSCC through the regimental FDC.

(g) MOIs established at the infantry regimental FSCC are —

| <u>To the Division FSCC</u> | <u>To the Battalion FSCC</u> | <u>To the Battalion FDC</u> | <u>To the Adjacent Regiment FSCC</u> |
|---|----------------------------------|---|--|
| FM;OBCO I/A ATI;CDR I/A ATI;AZR I/A ATI;SHR I/A ATI;CBTI I/A ATI;SVL I/A | AFU;UPDATE I/A AFU;AMMO I/A | SPRT;MAP I/A SPRT;BGEOM I/A SPRT;ZONE I/A | AFU;MFR I/B |

(h) MOIs established at the artillery regimental FDC are —

| <u>To the Division FSCC</u> | <u>To the TPC</u> | <u>To All Battalion FDCs</u> |
|---|---|--|
| AFU;UPDATE I/A AFU;AMMO I/A AFU;MFR I/A | SPRT;MAP I/A SPRT;BGEOM I/A SPRT;ZONE I/A ATI;CDR I/A ATI;SHR I/A AFU;UPDATE I/A AFU;AMMO I/A | SPRT;MAP I/A SPRT;BGEOM I/A SPRT;ZONE I/A FM;OBCO I/A MET;CM I/A |

(i) MOIs established at the TPC are —

| <u>To the Division FSCC</u> | <u>To the Regimental FDC</u> |
|---------------------------------|----------------------------------|
| FM;OBCO I/A | MET;CM I/A |

(j) MOIs established at the division FSCC are —

| <u>To the MEF FFCC</u> | <u>To the DASC</u> | <u>To the Artillery Regimental FDC</u> |
|---------------------------------|--|---|
| SPRT;BGEOM I/A SPRT;ZONE I/A | FM;OBCO I/A SPRT;BGEOM I/A SPRT;ZONE I/A SPRT;MAP I/A | SPRT;BGEOM I/A SPRT;ZONE I/A FM;OBCO I/A ATI;SHR I/A |

(5) Priority, Classification, Logging, and Display (PCLD) Changes. PCLD changes allow the operator to change the default settings that control message priority, printing (logging), display on screen, and security classification for transmission. The changes shown in figure 2-19 will be made. Additional changes are made at the discretion of the supervisor of each station.

NOTE: Changing a processable message to display **NO** will cause the computer to *automatically* process the message when received.

| MESSAGE | PRIORITY | LOGGING | DISPLAY |
|---|------------|---------|------------|
| AFU;AMMO | | | N |
| AFU;MFR | 5 | | N |
| AFU;UPDATE | 5 (NOTE 1) | | N (NOTE 1) |
| ATI;AZR | | | Y |
| ATI;CDR | | | Y |
| ATI;SHR | | | N |
| SPRT;BGEOM | 5 (NOTE 2) | | N (NOTE 2) |
| SPRT;ZONE | 5 (NOTE 2) | | N (NOTE 2) |
| MET;CM | | | N (NOTE 2) |
| FM;CFF | | | Y |
| FM;SUBS | | | Y |
| FM;OBCO | 5 (NOTE 3) | | N (NOTE 3) |
| NOTE 1: All FSCCs only. | | | |
| NOTE 2: All FDCs only. | | | |
| NOTE 3: All stations except battalion FSCC and TPC. | | | |

Figure 2-19. PCLD Changes

(6) Legal Message Setup. The BCT and LCU require the establishment of legal messages. This can be accomplished in one of two ways.

(a) Method One. For all subscribers, assign defaults. For all BCT/LCUs, make the following messages legal for all subscribers at or above battalion level:

- AFU;COMD
- ATI;COMD
- ATI;QUERY
- ATI;SEARCH
- ATI;SRI
- FM;ATTACK
- FM;MOD
- MET;COMD
- NNFP;ATTACK
- NNFP;FASCAM
- SPRT;COMD

(b) Method Two. Make all messages legal for all subscribers in the computer's legal subscriber (LGSB) setup.

(reverse blank)

Chapter 3

MCFSS Initialization

3001. General

Initialization is the procedure which constructs the data base in the LCU or BCT. During initialization, data is input that establishes the computer identity (**OWN NAME**), target block assignment, and tactical data that allow computers to determine tactical fire direction solutions. Because LCU/BCT (i.e., IFSAS or LTACFIRE) software is a derivative of the Army's TACFIRE system, computers are designed to function as tactical fire direction devices and not true fire support devices. The procedures directed in this chapter allow the LCU/BCT to best perform the various fire support functions.

3002. Tactical Fire Direction Modes

Though tactical fire direction at the battalion-battery level is outside the scope of this chapter, it is necessary to understand these modes as they affect the setup of computer equipment. MCFSS provides the capability to process missions in the following three different modes.

a. FSCC Approval Mode

In this mode, the observer transmits calls for fire to the battalion FSCC for positive clearance of fires. The battalion FSCC then transmits the cleared mission to the battalion FDC.

b. Centralized Mode

In this mode, the observer transmits all calls for fire to the battalion FDC. Clearance to fire is obtained by the automatic transmission of an MOI to the battalion FSCC.

c. MEU Operations Mode

This mode is similar to the FSCC Approval Mode, except that there is no battalion FDC to control the firing battery. In this mode, the battalion FSCC receives all calls for fire then selects the unit to attack the target and transmits a MOI to the Marine air-ground task force (MAGTF) FFCC.

3003. MAGTF Force Fires Coordination Center

a. Overview of Operations

The MAGTF FFCC coordinates with adjacent units (e.g., Army corps) and also resolves coordination of fires between subordinate elements. Targets beyond the FSCL are stored and managed at this level by the use of ATI MODE 3.

b. Communications

(1) **Nets.** The MAGTF FFCC communicates on the data nets as described in paragraph 2002.

(2) **Message of Interest.** The MAGTF FFCC establishes no required MOI files.

(3) **PCLD Changes.** Required PCLD changes from default settings are described in paragraph 2006a(5).

(4) **Relay Subscriber.** The MEF FFCC may communicate with the following stations using relay communications:

- DASC on the MEF FFC Net via the division FSCC.
- Regimental FSCCs on the MEF FFC Net via the division FSCC.
- Regimental FDC on the MEF FFC Net via the division FSCC.

The MEU FFCC may communicate with the following stations using relay communications:

- DASC or air support element (ASE) on the MEU FFC Net via the battalion landing team (BLT) FSCC.
- Battery FDC on the MEU FFC Net via the BLT FSCC.

c. Commander's Criteria

The following specific modifications to commander's criteria messages are required to enable the LCU/BCT to function as a MAGTF FFCC.

| | |
|------------------|--|
| FM;MOD | The current, active MAGTF ZONE name is entered. IGNORE AMMO causes the computer to solve all tactical fire control problems using the optimum ammunition. This overrides the ammunition available as reported in AFU;AMMO messages and results in assignment of ammunition that units may not possess. IGNORE AMMO is set to NO . |
| FM;ATTACK | Attack criteria are entered based on the tactical situation and the MAGTF commander's concept of operations. When changed, new commander's criteria is disseminated to subordinate commands via the appropriate message. |
| FM;FUSEL | No fire unit ordering or battalion assignment is necessary since all fire missions are passed to the regimental FDC using FM;CFF:X processing due to exclusion of fire units. |
| FM;XCLUDE | All fire units are excluded in the current situation. This is done to preclude generation of fire commands. |
| FM;CENTER | No fire units are assigned to center files since fire missions are passed to the regimental FDC via FM;CFF:X processing. |

3004. Division FSCC

a. Overview of Operations

The division FSCC coordinates operations and fire support with the MEF FFCC as necessary. It resolves coordination problems between subordinate units and, along with the regimental FDC, conducts fire planning for the division. The division FSCC stores the target files of the division and collects all **ATI** messages generated by subordinate units and agencies using **ATI MODE 3**.

b. Communications

(1) **Nets.** The division FSCC communicates on nets as described in paragraph 2002.

(2) **Message of Interest.** The division FSCC establishes MOI files as provided for in paragraph 2006a(4)(i).

(3) **PLCD Changes.** PCLD changes required from the default settings are described in paragraph 2006a(5).

(4) **Relay Subscriber.** The division FSCC can communicate with the following stations using relay communications:

- TPC on the Div FSC Net via the regimental FDC.
- Battalion FSCCs on the Div FSC Net via the regimental FSCC.

c. Commander's Criteria

In addition to the commander's criteria given verbally and in written orders, the following prerequisite changes must be made to employ the system.

| | |
|------------------|---|
| FM;MOD | The current, active division ZONE name is entered. IGNORE AMMO is set to NO . |
| FM;ATTACK | Attack criteria are entered based on the tactical situation. The division FSCC is responsible for updating not only their own attack method, but also the regimental FDC's attack data by transmitting the FM;ATTACK message for each change. |
| FM;FUSEL | All fire units are ordered under the artillery regiment's name since all fire missions are passed to the regimental FDC using a FM;CFF:X . Supporting NSFS ships may be ordered under the regimental FSCC's own name to allow the ships to be considered for engagement of targets processed by the FSCC computer. |
| FM;XCLUDE | No fire units are excluded in the current situation. |

- FM;CENTER** All artillery fire units are assigned to a center file under the regimental FDC's name.
- ATI MOD** The division FSCC is responsible for establishing and updating not only its own **ATI** modifications, but also for publishing and updating **ATI** modifications for the TPC based on commander's guidance.

3005. DASC

a. Overview of Operations

The DASC receives current and future operations **AFU** and **SUPPORT** data from the division FSCC.

b. Communications

(1) Nets. The DASC communicates on nets as described in paragraph 2002.

(2) Relay Subscriber. The DASC can access the following subscribers using relay communications:

- MEF FFCC on the Div FSC Net via the division FSCC.
- MEU FFCC on the Bn FSC Net via the BLT FSCC if supporting a MEU.
- Regimental FSCC on the Div FSC Net via the division FSCC.
- Regimental FDC on the Div FSC Net via the division FSCC.

c. Commander's Criteria

In addition to the commander's criteria given verbally and in orders, the following prerequisite changes must be made to employ MCFSS.

- FM;MOD** The current, active division **ZONE** name is entered. **IGNORE AMMO** is set to **NO**.
- FM;ATTACK** Attack criteria are entered based on that provided by the division FSCC.

| | |
|------------------|--|
| FM;FUSEL | No fire unit ordering or battalion assignment is necessary as all fire missions are passed to the division FSCC using FM;CFF:X processing due to exclusion of fire units. |
| FM;XCLUDE | All fire units are excluded in the current situation. This is done to preclude generation of fire commands. |
| FM;CENTER | No fire units are assigned to center files since fire missions are passed to the division FDC. |

3006. Infantry Regimental FSCC

a. Overview of Operations

The regimental FSCC coordinates operations and fire support with the division FSCC as necessary. It resolves coordination problems between subordinate battalions and, along with the supporting battalion FDC, conducts fire planning for the regiment. The regimental FSCC accesses the target files of the division. In the absence of a higher GCE headquarters, the regimental FSCC collects all ATI messages generated by subordinate units and agencies and maintains the target file by operating in **ATI MODE 3**.

b. Communications

(1) Nets. The regimental FSCC communicates on the nets described in paragraph 2002.

(2) Message of Interest. The regimental FSCC establishes MOI files as provided for in paragraph 2006a(4)(f).

(3) PCLD Changes. Required PCLD changes from the default settings are described in paragraph 2006a(5).

(4) Relay Subscriber. The regimental FSCC can access the following subscribers using relay communications:

- Division FSCC on the Regt FSC Net via the division FSCC.
- Regimental FDC on the Regt FSC Net via the division FSCC.
- Battery FDCs on the Regt FSC Net via the battalion FDC.
- Any subordinate FO on the Regt FSC Net via his battalion FSCC.

c. Commander's Criteria

ATI MOD Fire missions and target combinations are not generated at this level. **ATI;SVMOD** message **QMOD** value is set to **4.0**, and **ATI;FMMOD** message **WTYP** is set to **99** to preclude combinations or fire missions from being generated.

FM;MOD The current, active regimental **ZONE** name is entered. **IGNORE AMMO** is set to **NO**.

FM;ATTACK The infantry regimental commander establishes attack criteria based on his mission and concept of operations. The regimental FSCC is responsible for providing and updating commander's criteria for the supporting artillery battalion FDC as well as subordinate battalions' FSCCs. This attack criteria may differ from that established by the division FSCC. However, targets defined as "volleys" or "effects" targets will not be redefined. Only "desired effects" or "desired volleys" may be changed. This limitation is required to prevent the "desired volume of fire" in a **FM;CFF:X** (request for reinforcing fires) generated for a volleys target from being interpreted as "remaining effects to be achieved" at the regimental FDC (which maintains the division commander's attack method).

FM;FUSEL All fire units of the supporting artillery battalion FDC are ordered under the artillery battalion name. The mortar platoons of subordinate infantry battalions are ordered under their battalion FSCC name with a higher value (i.e., lower precedence)

than artillery units. Supporting NSFS ships may be ordered under the regimental FSCC's own name to allow the ships to be considered for engagement of targets processed at the FSCC computer.

- FM;XCLUDE** All fire units are excluded in the current situation. This is done to preclude generation of fire commands.
- FM;CENTER** The fire units of the supporting artillery battalion are assigned to a center file under the artillery battalion name. The mortar platoons of the subordinate battalions are assigned as centers under the battalions' FSCC names.

3007. Artillery Regimental FDC

a. Overview of Operations

The regimental FDC coordinates the operations of subordinate artillery battalions. The fires of the regiment are massed by the regimental FDC as the situation requires. Counterfire missions and planning are carried out by the regimental FDC and the TPC.

b. Communications

- (1) Nets.** The regimental FDC communicates on the nets described in paragraph 2002.
- (2) Message of Interest.** The regimental FDC establishes the MOI files as provided for in paragraph 2006a(4)(g).
- (3) PCLD Changes.** PCLD changes required from the default settings are described in paragraph 2006a(5).

(4) Relay Subscriber. The regimental FDC accesses the following stations using relay communications:

- MEF FFCC on the Div FSC Net via the division FSCC.
- DASC on the Div FSC Net via the division FSCC.
- Regimental FSCCs on the Regt FD Net via battalion FDCs.

c. Commander's Criteria

| | |
|------------------|---|
| FM;MOD | The regimental FDC establishes the current, active ZONE of the division. IGNORE AMMO is set to NO . AUTOFF is allowed to default to NO . |
| FM;ATTACK | The regimental FDC enters the same attack method as the division FSCC. |
| FM;FUSEL | Fire units of GS battalions are ordered to take precedence in selection (i.e., ordered with a lower number), followed by GSR battalions, and lastly (with the lowest precedence) DS fire units. |
| FM;XCLUDE | No fire units are excluded as a matter of setup. Tactical and operational requirements may dictate exclusions during actual operations. |
| FM;CENTER | All fire units of subordinate battalions are assigned to the battalion names as FM;CENTER files. |

3008. Maneuver Battalion FSCC

a. Overview of Operations

The battalion FSCC coordinates and clears fires for its supporting forward observers and other agencies firing into its zone. In conjunction with its supporting artillery, the battalion FSCC plans the fires of the battalion.

b. Communications

(1) Nets. The battalion FSCC communicates on the nets described in paragraph 2002.

(2) **Message of Interest.** The battalion FSCC establishes the MOI files as provided for in paragraph 2006a(4)(d).

(3) **PCLD Changes.** PCLD changes required from the default settings are described in paragraph 2006a(5)

(4) **Relay Subscriber.** The battalion FSCC can communicate with the following subscribers using relay communications:

- The division FSCC on the Regt FSC Net via the regimental FSCC.
- Firing batteries of the supporting artillery battalion that are netted on other COFs by relaying through the battalion FDC.

c. Commander's Criteria

| | |
|------------------|---|
| FM;MOD | The battalion FSCC establishes the current, active ZONE of the battalion. IGNORE AMMO is set to NO . |
| FM;ATTACK | The battalion FSCC enters the attack method based on the maneuver battalion commander's mission and concept of operations. |
| FM;FUSEL | Fire units of the supporting artillery battalion and any reinforcing artillery are ordered under the name of the DS battalion to take a lower precedence in selection (i.e., ordered with a higher number) than the organic mortar platoon. |
| FM;XCLUDE | No fire units are excluded as a matter of setup. Tactical and operational requirements may dictate exclusions during actual operations. |
| FM;CENTER | All fire units of supporting DS and R artillery battalions are assigned to the name of the DS battalion as center files. |

3009. Battalion FSCC Equipped with a DMS

a. Overview of Operations

When foot mobile, the battalion FSCC may not have the capability to access an LCU. A DMS may be used in the Fire Request Approval Mode to allow the battalion FSCC to coordinate fires. The FO transmits all calls for fire to the battalion FSCC where they are cleared then retransmitted to the artillery battalion FDC. Subsequent corrections are transmitted by the FO to the battalion FDC. Subsequent corrections and FO commands are reviewed at the battalion FSCC using the monitor capability of the DMS.

b. Communications

(1) Nets. The battalion FSCC communicates on a COF net. Communications with the regimental FSCC are achieved by relay through the battalion FDC.

(2) Authentication Code Files. Authentication files are established and assigned to any subscriber equipped with an LCU, BCT, or BCS, or for any subscriber that relays through these devices. The files are established by entering a serial number corresponding to the line number; e.g., at **CODE 02: __**, enter **02**. These are interpreted by other computer devices as serial numbers.

(3) FIST:YES/NO. **FIST:YES/NO** is established as **FIST:YES** with the battalion FDC as the **DFLT DEST** (default destination).

(4) ADDRESS FILE. **ADDRESS FILE** is modified so that the subordinate FOs are monitored using setting **B-ALL** (the FO as both **[B]** the source and destination of monitored messages with all **[ALL]** messages monitored).

3010. Artillery Battalion FDC

a. Overview of Operations

The battalion FDC's functions are governed by its tactical mission.

(1) FDCs of DS battalions perform tactical fire direction to support the infantry regiment or other designated unit; e.g., separate battalion. The FDCs of these battalions assist the infantry regimental FSCC in planning its supporting fires. Requests for reinforcing fires (**FM;CFF:X**) are transmitted to the regimental FDC which is established as the battalion FDC's default subscriber.

(2) R battalions augment the fires of the battalions they reinforce. The fire units of these battalions are controlled at the FDC of the reinforced battalion by the use of a center file and transmission of **FM;CFFs** to the FDC of the R battalion. The reinforced battalion FDC is established as the default subscriber of the R battalion.

(3) FDCs of GS battalions are controlled by the regimental FDC. The regimental FDC orders the fire units of these battalions with a lower value (i.e., higher priority) than other units. GSR battalions are ordered next, followed by DS battalions, and finally R battalions. The regimental FDC is established as the default subscriber of GS battalions.

(4) FDCs of GSR battalions augment the fires of the battalion they reinforce and answer calls for fire from the regimental FDC. The fire units of GSR battalions are controlled at the FDC of the battalion they reinforce by the use of a center file and transmission of **FM;CFFs** to the FDC of the GSR battalion. The regimental FDC orders GSR fire units under the **OWN NAME** of the GSR battalion with an ordering value greater than (i.e., of lower priority than) fire units of GS battalions but with a number less than (i.e., of greater priority than) fire units of DS battalions. The regimental FDC is established as the default subscriber of GSR battalions.

b. Communications

(1) **Nets.** The battalion FDC communicates on the nets described in paragraph 2002.

(2) **Message of Interest.** The battalion FDC establishes MOI files depending upon the battalion's mission as provided for in paragraph 2006a(4)(e).

(3) **PCLD Changes.** PCLD changes required from the default settings are described in paragraph 2006a(5).

(4) Relay Subscriber. The battalion FDC can access the following stations by relay communications:

- TPC on the Regt FD Net via the regimental FDC.
- Division FSCC on the Regt FD Net via the regimental FDC.

c. Commander's Criteria

| | |
|------------------|---|
| FM;MOD | The FDCs of DS or R battalions establish the current, active ZONE of the supported regiment. GS and GSR battalions establish the current, active zone of the division. IGNORE AMMO is set to NO . AUTOFF is set to YES . |
| FM;ATTACK | The artillery battalion FDC enters the same attack method as the regimental FSCC based on the supported regimental commander's mission and concept of operations. The supported regimental FSCC updates this data by transmitting the FM;ATTACK messages to the artillery battalion FDC as required. |
| FM;FUSEL | Fire units are ordered under the battalion name to take a higher precedence in selection (i.e., ordered with a lower number) than those of a supporting R battalion. Fire units of GSR or R battalions are ordered under the name of their respective battalions. |
| FM;XCLUDE | No fire units are excluded as a matter of setup. Tactical and operational requirements may dictate exclusions during actual operations. |
| FM;CENTER | All batteries of the R battalion are assigned to a center file under that battalion's name. |

3011. Firing Battery FDC

a. Overview of Operations

The battery FDC performs technical fire direction for its howitzers and executes fire plans received from higher headquarters.

b. Communications

(1) **Nets.** The battery FDC communicates on the nets described in paragraph 2002.

(2) **Relay Subscriber.** The battery FDC can access the following subscribers by using relay communications:

- Regimental FSCC on the COF net via the battalion FDC.
- Regimental FDC on the COF net via the battalion FDC.

c. Operational Modes

The setup of the BCS will differ depending upon the operational mode.

(1) The FSCC Approval Mode requires the BCS operator to enter the battalion FDC's logical name in the **RPTAMMO** field of the **SYS;SETUP** message. This causes the BCS to automatically update the ammunition file of the station identified each time a mission is ended.

(2) The Centralized Mode requires the BCS operator to enter the battalion FDC's logical name in the **RPTAMMO** field of the **SYS;SETUP** message. This causes the BCS to automatically update the ammunition file of the station identified each time a mission is ended.

(3) The MEU Operations Mode requires the BCS operator to enter the battalion FSCC's logical name in the **RPTAMMO** field of the **SYS;SETUP** message.

d. Geometry

The ability of the BCS to process and store support files is very limited. All geometry will be transmitted to the BCS along with all updates. The BCS only recognizes **SPRT;ZONE** and **SPRT;BGEOM** with a circular

restricted fire area (RFA) or forward line of own troops (FLOT). Other **SPRT;BGEOM** messages are received with an appended error message. These are printed and plotted.

3012. Forward Observer

a. Overview of Operations

The forward observer equipped with a DMS transmits calls for fire in support of his maneuver company. He inputs and forwards to the battalion FSCC the supported unit FLOT and nominates targets for inclusion into the target list. The observer uses **ATI** messages to report any target intelligence.

b. Communications

(1) Nets. The FO communicates on the nets described in paragraph 2002.

(2) Authentication Code Files. Authentication files are established and assigned to any subscriber equipped with an LCU, BCT, or BCS, or for any subscriber that relays through these devices. These files are established by entering a serial number corresponding to the line number; e.g., at **CODE 02: __**, enter **02**. These are interpreted by other computer devices as serial numbers.

(3) FIST:YES/NO. This setting is dependent on the operational mode and equipment used at the battalion FSCC.

(a) In the FSCC Approval Mode, the **FIST** field is set to **NO** and the battalion FSCC is entered as the **DFLT DEST** and the **FIST DEST**.

(b) In the Centralized Mode, the **FIST** field is set at **NO** and the battalion FDC is entered as the **DFLT DEST** and the **FIST DEST**.

(c) In the MEU Operations Mode, the **FIST** field is set to **NO** and the battalion FSCC is entered as the **DFLT DEST** and the **FIST DEST**.

c. Required Data Base Entries

The FO will make the following entries in all modes of operation.

(1) Initialization Menu

(a) **CONVERT:YES** is entered to convert "polar," "laser," and "shift" target locations to grids.

(b) **TOF VARIABLE** is determined to allow the DMS to compute "splash" time when TOF is received in the message to observer (MTO). **TOF VARIABLE** is computed by adding the net access delay for the maximum number of stations that the **FM;FOCMD** "shot" may be transmitted through plus two seconds for transmission; e.g., in the centralized mode, battery FDC net access time is 2 seconds, battalion FDC is 1 second, **TOF VARIABLE** is 5 (2+1+1).

(2) **Observer Location Menu.** The observer's current location must be on file. The following rules apply:

(a) The observer updates his location as soon as possible after moving and establishing a new position. This will be accomplished using the "locate observer" function of the DMS unless more accurate data is available.

(b) If the observer has not updated his location after moving, laser and polar target locations are not used.

(c) Observers will update locations when moving at time intervals specified by the controlling FSCC.

(d) When equipped with a laser, the observer will update cloud height and visibility at intervals established by the controlling FSCC.

(3) **Known Point File.** The observer stores all known points in the DMS known point files. This is a requirement to use **CONVERT:YES** to compute a grid and altitude for a "shift from known point" target location.

Chapter 4

Fire Mission Procedures

4001. General

Fire mission procedures are of special concern to all FDCs and FSCCs up through the regimental level. The automated environment requires precise and detailed procedures faithfully carried out by all stations to ensure timely fires and prevent fratricide.

4002. Modes of Operation

a. FSCC Approval Mode

The FSCC Approval Mode employs positive clearance of fire procedures (see page 8-10 of FMFM 6-9, *Marine Artillery Support*, and page 6-11 of FMFM 6-18, *Techniques and Procedures for Fire Support Coordination*). In this mode, the FO sends missions directly to his maneuver battalion FSCC. The battalion FSCC clears each mission and routes the mission to the artillery battalion FDC for tactical fire direction. The battalion FDC determines which units will fire, the volume of fire, and the shell/fuze to fire, and then routes the fire order to the appropriate firing battery. The battery executes the fire order and reports "ready," "shot," and "rounds complete" to the battalion FDC. Messages that do not involve tactical fire direction or coordination (e.g., MTOs, "ready," "shot," "rounds complete") are automatically routed through the system to the FO.

(1) Advantages. This mode keeps all stations in a direct loop. The FSCC filters coordination problems from the battalion FDC so that it can concentrate on tactical fire direction and control of the firing batteries. This mode ensures positive clearance of each and every fire mission and also best employs the communication equipment currently in the Marine Corps inventory. The maneuver battalion FSCC may be the only agency positioned to communicate with both the FO and artillery battalion FDC. This mode is also faster when there is a high volume of missions requiring coordination.

(2) Disadvantages. This mode is slower than other modes when the volume of missions requiring coordination is low. Additionally, several types of missions (e.g., final protective fires [FPF], illumination, Copperhead, and family of scatterable mines [FASCAM]) cannot be processed in this mode.

b. Centralized Mode

The Centralized Mode can support either positive or passive clearance of fire procedures. In this mode, the FO sends missions to the artillery battalion FDC. A MOI is automatically received at the maneuver battalion FSCC when the FDC's BCT operator enters the mission. When operating under positive clearance procedures, the FDC awaits clearance from the FSCC or, if the target is located beyond a permissive fire support coordination measure, proceeds to fire the mission. When operating under passive clearance procedures, the FDC proceeds with mission processing unless the FSCC denies clearance. Because of the operating speed of MCFSS, passive clearance procedures may not allow the FSCC sufficient time to assess and coordinate fire missions and thus should be employed with discretion. The firing battery FDC receives the fire order in the same manner as in the FSCC Approval Mode.

(1) Advantages. For a single mission, this method is faster than the FSCC Approval Mode. This method preserves all the artillery battalion FDC's tactical fire direction authority thus enabling the battalion to rapidly mass fires as required. If the battalion FSCC loses digital communications, the battalion FDC can still clear missions in this mode by voice.

(2) Disadvantages. This mode places a heavier coordination burden on artillery battalion FDCs. It may also be unrealistic to expect the FO to range the battalion FDC with a man-packed radio in all situations. Some communications relay may have to be established.

c. MEU Operations Mode

The MEU Operations Mode employs positive clearance of fire procedures. In this mode, the FO sends his call for fire to the maneuver battalion FSCC. The battalion FSCC processes the mission in the LCU, and the fire support coordinator (FSC) determines the fire support means to be used to attack the target. If the FSC clears the mission but selects a different, more appropriate weapon system to attack that particular target, he gives the

mission to the selected fire support agency while maintaining communications with the FO on the data communications net. If the FSC clears the mission and selects artillery to conduct the attack, the mission is transmitted to the firing battery FDC as a **FM;CFF:O**. In other modes of operation, the **FM;CFF:O** is considered a fire order and is, therefore, not altered at the battery FDC. In this mode, the fire order is a *recommended* fire order and may be altered by the battery fire direction officer. This enables the artillery commander on the scene to exercise tactical fire direction for each mission while still considering the FSCC's guidance.

(1) Advantages. This method should only be employed when the commander desires to dedicate a battery to a maneuver battalion, as in the BLT of a MEU. When a higher artillery headquarters is not available, this mode best exercises the capabilities of MCFSS. The only alternative for this situation is to transmit FO fire requests directly to the firing battery FDC. This would essentially exclude the battalion FSCC from the decisionmaking process, complicate clearance of fire procedures, and limit the ability to redirect the fire mission to other means which may be more effective for a given target.

(2) Disadvantages. This method gives a degree of the artillery commander's tactical fire direction authority to the battalion FSC.

4003. Common Aspects of All Modes

Basic rules that apply to *all* fire mission processing modes are provided in this paragraph.

a. Target Location

All targets are transmitted as **FR GRID** missions from the DMS by selecting **CONVT:YES** in the DMS INIT screen and ensuring that all known points and observer locations are stored in the DMS.

b. Altitudes

Altitudes of grid missions are the responsibility of the battalion FDC (battery FDC if operating in the MEU Operations Mode). Missions passed through other devices are defaulted to the altitude of the first fire unit selected or the observer's altitude. The FDC will ensure the correct map-spotted altitude is entered.

c. Replot

In terrain characterized by significant relief, replot grids and altitudes are required to accurately mass fires. See paragraph 4009c for detailed replot procedures.

4004. FSCC Approval Mode

a. Required Data Base Changes

To enable fire missions to process in the FSCC Approval Mode, a number of changes must be made to the data bases.

(1) Artillery Battalion FDC. The battalion FDC deletes MOIs for each supported battalion FSCC for **FM;CFF**, **FM;QF**, and **FM;SUBS**.

(2) Maneuver Battalion FSCC. The battalion FSCC creates a **FM;CENTER** file by ordering and assigning all artillery fire units under the artillery battalion name. Organic mortars are ordered with a higher number; i.e., lower precedence for selection.

(3) Infantry Regimental FSCC. The regimental FSCC creates a **FM;CENTER** file by ordering and assigning all artillery fire units under the artillery battalion name. Organic mortars are excluded in the current plan.

b. Limitations

(1) Because of the software design of the **FM;CENTER** file function, several missions cannot be fired using **FM;CENTER** file. The following missions require additional and more complex steps (see paragraph 4008):

- FPFs
- All missions firing shell illumination
- Copperhead missions
- FASCAM targets of opportunity

(2) Any mission ended with **EOMRAT** at the DMS causes that target to be stored as a known point at the computer that is first to receive the message. This causes a request to "record as target" to store the target at the maneuver battalion FSCC and not the artillery battalion FDC. Even if the known point is transmitted to the artillery battalion FDC, it may not be

assigned the same known point number by the receiving computer. This presents a problem for missions that must be processed through the battalion FDC (i.e., Copperhead, FASCAM, and illumination missions) located by shift from a known point method. To eliminate the effects of this problem —

- (a) The battalion FSCC displays the **FM;SUBS** with **EOM:X** and **RAT:K**, and then retransmits it to the battalion FDC by selecting **ACTION, XMIT**.
- (b) The battalion FSCC then selects **ACTION, ENTER** to end the mission. The fire mission chain is discarded.
- (c) The battalion FDC **ACTION, ENTERS** the **FM;SUBS**, ending the mission and recording the known point. A **FM;MTO** is generated to alert the FO of the assigned known point number. This **FM;MTO** is addressed to the maneuver battalion FSCC.
- (d) The battalion FSCC receives the **FM;MTO** in the alert queue and retransmits it to the FO, who stores the known point.
- (e) The FO, using **CONVT:YES**, transmits only grid locations of targets.

c. Generic Mission Flow

Figures 4-1 and 4-2 provide an example of the message flow for a fire mission requiring coordination processed in the FSCC Approval Mode.

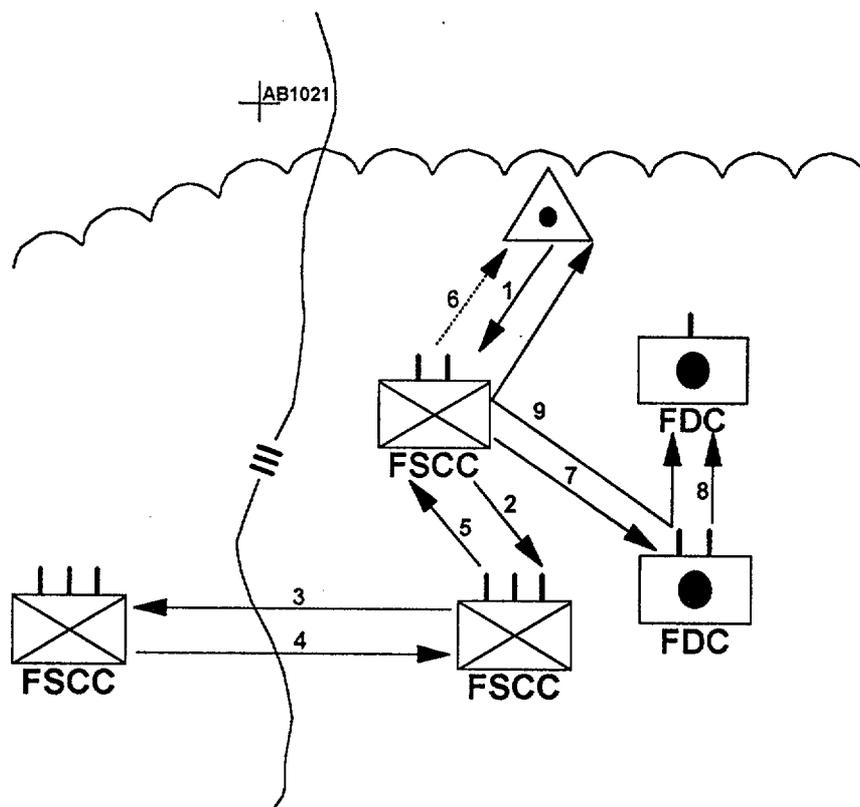


Figure 4-1. Message Flow for FSCC Approval Mode with Target Across Regimental Boundary

| AGENCY/ DEVICE | STEP (See figure 4-1) | REMARKS |
|---------------------------|---|---|
| FO/DMS | 1. FO locates target/requests fire from battalion FSCC. | FO composes and transmits the FR to battalion FSCC. |
| Battalion FSCC/LCU | 2. If the mission requires coordination, battalion FSCC passes the FM;CFF to the affected FSCC. | Battalion FSCC actions received FM;CFF. As a result of FM;CENTER file processing, solution is FM;CFF addressed to battalion FDC. Battalion FSCC readdresses the FM;CFF to the affected adjacent battalion FSCC or to the regimental FSCC if target plots outside regimental zone. If clearance is denied, go to step 6. |
| Regimental FSCC/LCU | 3. Regimental FSCC transmits FM;CFF to the affected FSCC. | Regimental FSCC actions received FM;CFF. The solution is FM;CFF addressed to battalion FDC as a result of FM;CENTER file processing. Regimental FSCC readdresses and transmits the FM;CFF to FSCC in whose zone the target plots. |
| Affected FSCC/LCU | 4. Affected FSCC clears/denies the mission. | FSCC actions/plots mission and transmits clearance to regimental FSCC in a SYS;PTM:____ [target number] CLEARED/DENIED or by voice. |
| Regimental FSCC/LCU | 5. Regimental FSCC passes clearance to battalion FSCC. | Regimental FSCC passes CLEARED/DENIED message by digital or voice communications. |
| Battalion FSCC | 5A. Battalion FSCC acts on the clearance/denial. | If the mission is denied, go to step 6; if the mission is cleared, go to step 7. |
| Battalion FSCC/LCU | 6. Battalion FSCC denies the mission to FO and deletes the mission. | Battalion FSCC discards all FM;CFF messages from the message chain of the denied mission. A SYS;PTM:____ [target number] DENIED or voice denial is transmitted to the FO. |
| Battalion FSCC/LCU | 6A. Battalion FSCC deletes the mission. | Battalion FSCC uses FM;COMD message with option DELETE to clear fire mission from the file. |
| Battalion FSCC/LCU | 7. Battalion FSCC transmits FM;CFF to battalion FDC. | LCU operator transmits FM;CFF as directed by the liaison officer (LnO) or liaison chief (LnChf). NOTE: If FM;CFF was transmitted to regimental FSCC for clearance, fire mission chain must be regenerated to transmit FM;CFF to battalion FSCC. To do this, LCU operator redisplay fire mission chain by using FM;COMD message with option EDIT and target number. |

Figure 4-2. Message Flow Steps for FSCC Approval Mode

| AGENCY/ DEVICE | STEP (See figure 4-1) | REMARKS |
|-------------------|--|---|
| Bn FDC/ BCT | 8. Battalion FDC processes the fire mission. | Received FM;CFF is processed at the BCT and plotted. FSCM and boundary violations are ignored since receipt of mission from battalion FSCC indicates prior clearance. The fire mission chain is transmitted to send fire orders and MTO. |
| Battery FDC/ BCS | 9. Battery FDC executes the FM;CFF:O . | The plot of the target is checked for safety, minimum quadrant violations, intervening crests, and accuracy in computer selection of charge and lot. If the mission is in AMC status, go to step 9A; if the mission is in WR status, go to step 9D. |
| Battery FDC/BCS | 9A. Battery FDC passes "ready" to FO. | BCS operator passes "ready" to FO as directed by operations chief (OpsChf)/fire direction officer (FDO). FM;FOCMD READY is automatically addressed to battalion FDC. The message automatically prints and retransmits to the FO. |
| FO/DMS | 9B. FO passes "fire" to battery FDC. | At appropriate time, FO transmits COMMAND message to battalion FSCC to fire the mission. |
| Battery FDC/BCS | 9C. Battery fires mission at the FO's command. | As long as automatic authentication is specified at the BCS, the command to fire is automatically passed to gun display units (GDUs). Mission commands appear on BCS screen with mission marked by two blocks in the upper display. |
| Battery FDC/BCS | 9D. Battery FDC passes "shot" to FO. | Battery FDC transmits the FM;FOCMD message with SHOT . |
| FO/DMS | 9E. FO receives "shot." | The DMS alarm sounds and a solid square appears in the display's lower right corner to indicate receipt of a fire mission message. If time of flight was indicated in the MTO, the splash countdown appears in lower portion of display. |
| Battery FDC/BCS | 9F. Battery passes "splash" to FO. | Battery FDC passes "splash" to FO only if one of the following conditions exists: <ul style="list-style-type: none"> • Splash is requested. • Trajectory fired is high angle. • Observer is aerial observer (AO) or UAV. |
| FO/DMS | 10. FO passes corrections to battalion FSCC. | Cycle continues. Corrections that cross FSCMs or boundaries require additional coordination. |

Figure 4-2 (continued). Message Flow Steps for FSCC Approval Mode

4005. Centralized Mode

a. Required Data Base Changes

To allow fire missions to process in the centralized mode, a number of changes must be made to the following data bases.

(1) Artillery Battalion FDC. The battalion FDC enters an MOI for each supported battalion FSCC for **FM;CFF**, **FM;SUBS**, and **FM;QF**. Action code is **I** (incoming); direction code is **B** (if from observers or zone) for **FM;CFF** and **FM;SUBS**, or **C** (if from observers) for **FM;QF**. The supporting FO's and the battalion FSCC's zone are associated with the MOI.

(2) Maneuver Battalion FSCC. The battalion FSCC creates a **FM;CENTER** file by ordering and assigning all artillery fire units under the DS artillery battalion name. Organic mortars and any assigned DS NSFS ship are ordered under the battalion FSCC's own name.

(3) Infantry Regimental FSCC. The regimental FSCC creates a **FM;CENTER** file by ordering and assigning all artillery fire units under the DS artillery battalion name. Organic mortars are excluded in the current plan.

b. Generic Mission Flow

Figures 4-3 and 4-4 provide an example of the message flow for a fire mission processed in the centralized mode.

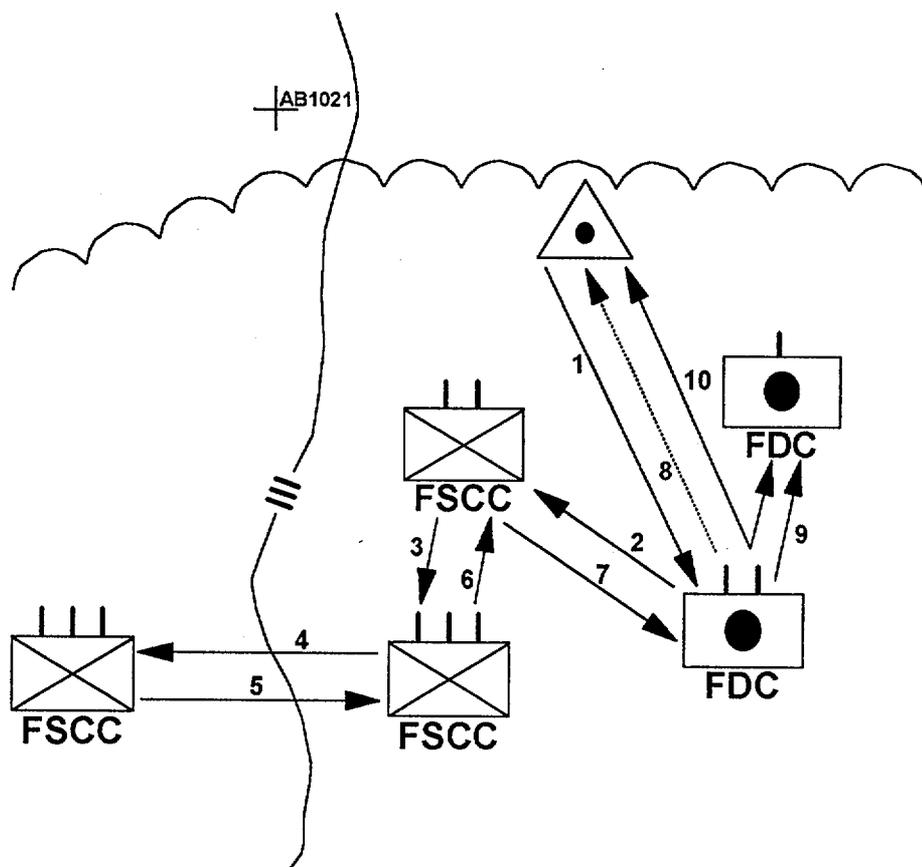


Figure 4-3. Message Flow for Centralized Mode with Target Across Regimental Boundary

| AGENCY/ DEVICE | STEP (See figure 4-3) | REMARKS |
|---------------------------|--|---|
| FO/DMS | 1. FO locates target/requests fire from battalion FDC. | FO composes and transmits the FR to the battalion FDC. |
| Battalion FDC/BCT | 2. Battalion FDC passes the FM;CFF to the battalion FSCC for clearance. | The message is passed from battalion FDC to battalion FSCC via MOI processing established at battalion FDC. Battalion FSCC may approve the mission, assign the mission to another fire support means, or seek clearance. |
| Battalion FSCC/LCU | 3. If the mission requires coordination, battalion FSCC passes the FM;CFF to the affected FSCC. FM;CFF:Os are not transmitted to firing batteries until the mission is approved. | Battalion FSCC actions the received FM;CFF. The solution is a FM;CFF addressed to battalion FDC as a result of FM;CENTER file processing. Battalion FSCC readdresses the FM;CFF and transmits it to the affected sister battalion FSCC or regimental FSCC for targets outside the regimental zone. If clearance is denied by a sister battalion FSCC, go to step 8. |
| Regimental FSCC/LCU | 4. Regimental FSCC transmits the FM;CFF to the affected FSCC. | Regimental FSCC actions the received FM;CFF. The solution is a FM;CFF addressed to battalion FDC as a result of FM;CENTER file processing. Regimental FSCC readdresses/transmits FM;CFF to the FSCC in whose zone the target plots. |
| Affected FSCC/LCU | 5. Affected FSCC clears/denies the mission. | Affected FSCC actions/plots the mission. Clearance is transmitted in SYS;PTM:____ [target number] CLEARED/DENIED or by voice to regimental FSCC. |
| Regimental FSCC/LCU | 6. Regimental FSCC passes clearance to battalion FSCC. | Regimental FSCC passes CLEARED/DENIED message by digital or voice communications. |
| Battalion FSCC/LCU | 7. Battalion FSCC passes clearance/denial to battalion FDC. | Battalion FSCC passes the CLEARED/DENIED message by data or voice communications. If the mission is denied, go to step 8; if the mission is cleared, go to step 9. |
| Battalion FDC/BCT | 8. Battalion FDC denies the mission to the FO. | Battalion FDC discards all FM;CFF:O messages from the message chain of the denied mission. A SYS;PTM:MSN#____ [1 or 2] DENIED is transmitted to the FO. (DMS does not recognize FM;MTO method of engagement field DENIED.) |

Figure 4-4. Message Flow Steps for Centralized Mode

| AGENCY/ DEVICE | STEP (See figure 4-3) | REMARKS |
|----------------------|--|--|
| Battalion FDC/BCT | 8A. Battalion FDC deletes the mission. | Fire mission is cleared from fire mission files using FM;COMD message with option DELETE . |
| Battalion FDC/BCT | 9. Battalion FDC transmits fire orders to the batteries. | BCT operator transmits FM;CFF:O(s) to fire unit(s) when directed by the OpsChf/FDO. |
| Battery FDC/BCS | 10. Battery FDC executes the FM;CFF:O . | Target plot is checked for safety, minimum quadrant violations, intervening crests, and accuracy in computer selection of charge and lot. If mission is in AMC status, go to step 10A; if mission is in WR status, go to step 10D. |
| Battery FDC/BCS | 10A. Battery FDC passes "ready" to FO. | BCS operator passes "ready" to FO as directed by the OpsChf/FDO. FM;FOCMD READY is automatically addressed to battalion FDC, where it automatically prints and retransmits to FO. |
| FO/DMS | 10B. FO passes "fire" to battery FDC. | At appropriate time, FO transmits COMMAND message to battalion FDC to fire the mission. |
| Battery FDC/BCS | 10C. Battery fires mission at FO's command. | As long as automatic authentication is specified at BCS, the command to fire is automatically passed to GDUs. Mission commands appear on BCS screen with mission marked by two blocks in the upper display. |
| Battery FDC/BCS | 10D. Battery FDC passes "shot" to FO. | Battery FDC transmits the FM;FOCMD message with SHOT . |
| FO/DMS | 10E. FO receives "shot." | DMS alarm sounds and a solid square appears in the lower right corner of the display to indicate receipt of fire mission message. If time of flight was indicated in the MTO, the splash countdown appears in lower portion of display. |
| Battery FDC/BCS | 10F. Battery FDC passes "splash" to FO. | Battery FDC passes "splash" to FO only if one of the following conditions exists: <ul style="list-style-type: none"> • Splash is requested. • Trajectory fired is high angle. • Observer is an AO. |
| FO/DMS | 11. FO passes corrections to battalion FDC. | Cycle continues. Corrections that cross FSCMs or FSCMs require additional coordination. |

Figure 4-4 (continued). Message Flow Steps for Centralized Mode

4006. MEU Operations Mode

a. Required Data Base Changes

To allow fire missions to process in the decentralized mode, a number of changes must be made to the following data bases.

(1) Firing Battery FDC. The battery FDC enters the battalion FSCC's logical name in the **RPTAMMO** field of the **SYS;SETUP** message.

(2) Maneuver Battalion FSCC. The battalion FSCC orders the firing battery, any NSFS ship, and the organic mortar platoon under the battalion FSCC's own name. The ordering values depend upon mission and commander's criteria. The battalion FSCC enters an MOI for the MAGTF FFCC for **FM;CFF**, **FM;SUBS**, and **FM;QF**. Action code is **I** (incoming) and direction code is **A** (always).

(3) MEU FFCC. The MEU FFCC creates a **FM;CENTER** file by ordering and assigning all artillery fire units under the artillery name. Organic mortars are excluded in the current plan.

b. Selecting the Means to Attack the Target

The maneuver battalion FSCC is not involved in tactical fire direction; however, it will process incoming calls for fire to decide the appropriate means for attack of the target. If a fire support means other than artillery is selected, the representative from that agency is given the mission. Communications may be maintained with the requestor on the data net or he may be directed to another net for this mission.

c. Generic Mission Flow

Figures 4-5 and 4-6 provide an example of the message flow for a fire mission processed in the MEU Operations Mode.

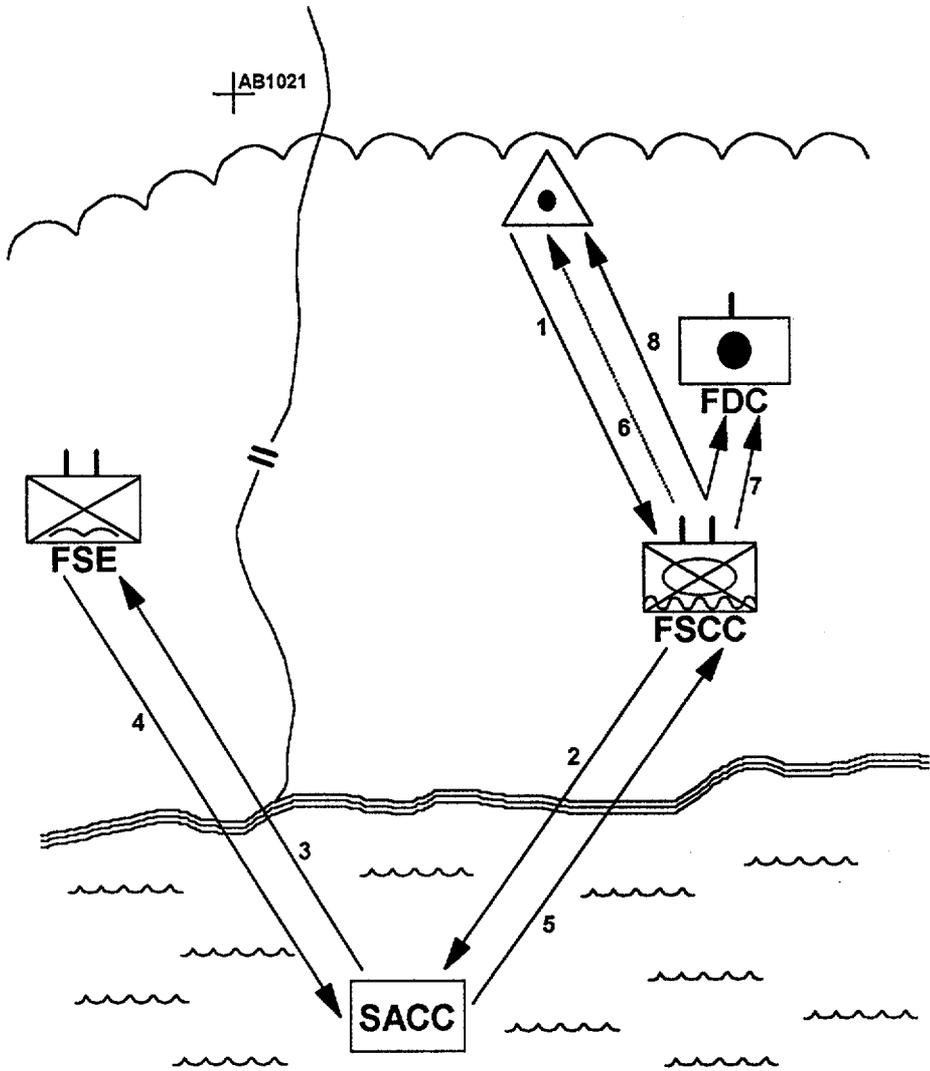


Figure 4-5. Message Flow for MEU Operations Mode

| AGENCY/ DEVICE | STEP (See figure 4-5) | REMARKS |
|---------------------------|--|---|
| FO/DMS | 1. FO locates a target. | FO composes/transmits FR to battalion FSCC. |
| Battalion FSCC/LCU | 2. If mission requires coordination, battalion FSCC passes FM;CFF to SACC/MEU FFCC. | Battalion FSCC ACTION, ENTERS the FM;CFF. Target is plotted and transmitted to SACC/MEU FFCC via MOI processing. Battalion FSCC may — <ul style="list-style-type: none"> • Approve the mission. • Assign the mission to another available fire support means (see paragraph 4006b). • Request clearance outside the battalion zone by transmitting a SYS;PTM. |
| SACC-MEU FFCC/LCU | 3. SACC/MEU FFCC plots the mission and determines if the mission requires coordination outside the MEU zone or if the attack should be conducted with means not immediately available to battalion FSCC. | SACC/MEU FFCC actions the received FM;CFF. Solution is FM;CFF addressed to battalion FSCC as a result of FM;CENTER file processing. SACC/MEU FFCC may assign another fire support means and notify the FSCC by voice or SYS;PTM. If another fire support means is not assigned and the mission lies outside the amphibious objective area (AOA), the SACC/MEU FFCC seeks clearance by voice communications with the affected force. |
| SACC-MEU FFCC/LCU | 4. SACC/MEU FFCC passes the clearance to battalion FSCC. | SACC/MEU FFCC passes the CLEARED/DENIED message by SYS;PTM: _____ [target number] CLEARED/DENIED or by voice communications. If the mission is denied, go to step 5; if the mission is cleared, go to step 6. |
| Battalion FSCC/LCU | 5. Battalion FSCC denies the mission to FO. | Battalion FSCC transmits denial as a SYS;PTM: _____ [target number, mission number] DENIED. |
| Battalion FSCC/LCU | 5A. Battalion FSCC ends the mission. | The LCU operator completes and executes a FM;SUBS with EOM:X. |
| Battalion FSCC/LCU | 6. Battalion FSCC transmits call for fire to battery FDC. | Battery FDC receives the FM;CFF:O. Solution, based on commander's criteria, is presented to battery FDO. Battery FDO may elect to alter solution to perform tactical fire direction. If mission is in AMC status, go to step 6A; if the mission is in WR status, go to step 6D. |

Figure 4-6. Message Flow Steps for MEU Operations Mode

| AGENCY/ DEVICE | STEP (See figure 4-5) | REMARKS |
|--------------------|--|---|
| Battery FDC/BCS | 6A. Battery FDC passes "ready" to FO. | The BCS operator passes "ready" to the FO when directed by the OpsChf/FDO. The FM;FOCMD READY is automatically addressed to the FO. |
| FO/DMS | 6B. FO passes "fire" to battery FDC. | At appropriate time, FO transmits a COMMAND message to battery FDC to fire mission. |
| Battery FDC/BCS | 6C. Battery fires mission at the FO's command. | As long as automatic authentication is specified at the BCS, the command to fire is automatically passed to GDUs. Mission commands appear on BCS screen, and mission is marked by two blocks in the upper display. |
| Battery FDC/BCS | 6D. Battery FDC passes "shot" to FO. | Battery FDC transmits the FM;FOCMD message with SHOT . |
| FO/DMS | 6E. FO receives "shot." | The DMS Alarm sounds and a solid square appears in the right corner of the display to indicate receipt of a fire mission message. If time of flight was indicated in the MTO, the splash countdown appears in lower portion of display. |
| Battery FDC/BCS | 6F. Battery FDC passes "splash" to FO. | Battery FDC passes "splash" to FO only if one of the following conditions exists: <ul style="list-style-type: none"> • Splash is requested. • Trajectory fired is high angle. • Observer is an AO. |
| FO/DMS | 7. FO passes subsequent corrections to battalion FSCC. | Cycle continues. Corrections that cross FSCMs or boundaries require additional coordination. |

Figure 4-6 (continued). Message Flow Steps for MEU Operations Mode

4007. Special Missions

a. Copperhead

Firing the M712 Copperhead projectile is accomplished using one of the two following procedures.

(1) Copperhead Targets of Opportunity. These missions require rapid communications between the firing battery and observer. Because of this, the BCT/LCU will not process the mission through a **FM;CENTER** file and these targets must be processed at the battalion FDC.

(2) Copperhead Priority Target Missions. These missions are established using **ASSIGN PPF** and specifying Copperhead munitions.

(3) In either mission, the **FM;MTO** is generated at the firing battery FDC's BCS. The **CPRHD** of the **FM;MTO** field contains three subfields which contain information the observer needs to orient the Copperhead footprint:

- [1] Direction, **L** (left), **R** (right), or **O** (on line), of the gun-target (**GT**) line compared to the observer-target (**OT**) line.
- [2] Angle **T** expressed in hundreds of mils.
- [3] **GT** range expressed in hundreds of meters.

| |
|---|
| <p>NOTE: The DMS receives [1] and [2] as angle T and [3] as probable error in</p> |
|---|

b. FASCAM Targets of Opportunity

FASCAM targets are processed in a procedure similar to Copperhead missions. FASCAM missions will not process through **FM;CENTER** files at the BCT or LCU. Therefore, the **FM;CFF** must be transmitted to the battalion FDC. The same routing applies as for the Copperhead mission except the designate command is not required. In addition, the BCT or LCU will generate a **SPRT;BGEOM** containing the corner grids of the FASCAM danger zone in the form of a laid FASCAM safety zone (**LFSZ**). If the mission is fired from the BCS, the safety zone must be manually plotted and forwarded to the FSCC in whose zone the mission plots.

c. Illumination

Illumination missions cannot be processed through a **FM;CENTER** file. This requires that any mission requesting illumination be processed at the battalion FDC. In addition, the synchronized effort required to mark and coordinate illumination fires with shell high explosive (HE) makes coordinated illumination missions difficult to control from the FDC.

- (1) To process coordinated illumination, use one of the following options:
 - (a) Process the marking and firing of illumination using traditional voice procedures.
 - (b) Direct the FO to control the timing and command "fire" for both HE and illumination.

- (2) If coordinated illumination is requested in the initial call for fire, the BCT/LCU or BCS will generate two **FM;CFFs**, but only if fire units not assigned to centers are available for selection. The first **FM;CFF** is for the illumination target; the second for the HE target. If **FM;CENTER** files exist, the mission is not placed in the fire mission file. The following options can be used to process coordinated illumination missions:
 - (a) Use two separate missions and do not specify coordinated illumination in the illumination **FM;CFF**. Specific procedures associated with this option are —
 - The observer composes and transmits the request for illumination as an illumination only mission vice a coordinated illumination mission.
 - When the observer desires to fire coordinated illumination, the HE mission is transmitted as a separate fire mission.
 - If the FO controls the firing of both missions (the recommended procedure), the missions are transmitted as **AMC** (at my command) fire missions. If the FDC is to control the firing, the observer precedes the HE mission with a text message: **SYS;PTM CRI _____** [target number of the illumination mission] **FOLLOWS**.
 - If the firing is controlled from the FDC, the observer marks the illumination or transmits a **FM;FOCMD** message with **DESIG**

(designate). If the **FM;FOCMD** message is used, the message is transmitted approximately 10 seconds early to account for transmission delays.

- If the firing is controlled by the observer, he transmits a **FM;FOCMD** message at the appropriate time for each mission.

(b) Specify coordinated illumination in the illumination FM;CFF:

- Process the illumination mission, while sending the associated **HE** mission to the battery FDC in a **DNL** (do not load) status (accomplished by modifying the **FM;CFF:O**).
- Have the observer transmit the first **HE** correction as the shift required to move the original illumination target location to the actual **HE** target location.

4008. Special Mission Processing

The following procedures apply based on the mode of operation.

a. FSCC Approval Mode

Special missions are not processed in the FSCC approval mode due to problems already noted in **FM;CENTER** files. These missions will be processed through the battalion FDC. Since MOIs for **FM;CFF** are not transmitted from the artillery battalion FDC to the maneuver battalion FSCC in the FSCC Approval Mode, coordination of fire missions received directly at the battalion FDC is performed using **SYS;PTM** messages or voice communications.

b. Centralized Mode

This is the preferred method for processing special missions. Figure 4-7 illustrates the message flow for processing special missions in the Centralized Mode and additional steps for processing when the FSCC Approval Mode is used for normal fire missions.

c. MEU Operations Mode

This processing mode presents no unique problems for special missions, processing them in the same manner as other missions.

| AGENCY/ DEVICE | STEP | REMARKS |
|---------------------|--|---|
| FO/DMS | 1. FO locates a target and transmits fire request to battalion FDC. | FO composes/transmits FR to battalion FDC. Any method of target location is legal. FFE shell CPRHD, ILLUM, or MINE is specified or PRIORITY:ASSIGN FPF is used. |
| Battalion FDC/BCT | 2. Battalion FDC requests clearance from battalion FSCC. | BCT operator completes SYS;PTM with target number, six digit grid, munitions in effect, and REQ CLR, and transmits this to battalion FSCC. NOTE: If all fire missions are being processed in the Centralized Mode, a FM;CFF is transmitted via MOI to battalion FDC. Battalion FSCC then retransmits FM;CFF in place of SYS;PTM to request further coordination. |
| Battalion FSCC/LCU | 3. If the mission requires coordination, battalion FSCC requests clearance from regimental FSCC. | Battalion FSCC manually plots grid received in the SYS;PTM. If further coordination is required, the received SYS;PTM is readdresses and transmitted to regimental FSCC. |
| Regimental FSCC/LCU | 4. Regimental FSCC transmits SYS;PTM to affected FSCC. | Regimental FSCC plots received target, readdresses received SYS;PTM, and transmits it to the FSCC in whose zone the target plots. |
| Affected FSCC/LCU | 5. Affected FSCC clears/denies the mission. | Affected FSCC plots mission. SYS;PTM is changed from REQ CLR to CLEARED or DENIED and transmitted to regimental FSCC. |
| Regimental FSCC/LCU | 6. Regimental FSCC passes clearance to battalion FSCC. | Regimental FSCC passes the CLEARED/DENIED message by data or voice communications. |
| Battalion FSCC/LCU | 7. Battalion FSCC passes clearance/denial to battalion FDC. | Battalion FSCC passes the CLEARED/DENIED message by data or voice communications. If the mission is denied, go to step 8; if the mission is cleared, go to step 9. |
| Battalion FDC/BCT | 8. Battalion FDC denies the mission to FO. | Battalion FDC changes __ [target number] to __ [mission number] and transmits SYS;PTM. |

Figure 4-7. Special Mission Processing Steps in Centralized Mode

| AGENCY/ DEVICE | STEP | REMARKS |
|---------------------------|---|---|
| Battalion FDC/BCT | 8A. Battalion FDC deletes mission. | FM;SUBS with EOM:YES is received. Battalion FDC enters FM;SUBS and deletes EOM FM;SUBS. |
| Battalion FDC/BCT | 9. Battalion FDC transmits FM;CFF:O and FM;MTO. | Battery FDC processes mission as any other area fire mission. |
| Battery FDC/BCS | 10. Battery FDC executes the FM;CFF:O. | Target plot is checked for safety, minimum quadrant violations, intervening crests, and accuracy in computer selection of charge and lot. If mission is in AMC status, go to step 10A, if mission is in WR status, go to step 10D. |
| Battery FDC/BCS | 10A. Battery FDC passes "ready" to FO. | BCS operator passes READY to FO as directed by the OpsChf/FDO. FM;FOCMD READY is automatically addressed/retransmitted to FO. |
| FO/DMS | 10B. FO passes "fire" to battalion FDC as required. | At appropriate time, FO transmits a COMMAND message to battalion FDC to fire mission. |
| Battalion FDC/BCT | 10C. Battalion FDC fires mission at FO's command. | FOCMD is transmitted automatically to the BCS. |
| Battery FDC/BCS | 10D. The battery FDC passes "shot" to the observer. | As long as automatic authentication is specified at the BCS, the command to fire is automatically passed to GDUs. Mission commands appear on BCS screen with mission marked by two blocks in the upper display. Battery FDC transmits the FM;FOCMD message with SHOT. |
| FO/DMS | 10E. The observer receives "shot." | The DMS alarm sounds and a solid square appears in the display's lower right corner to indicate receipt of fire mission message. If time of flight was indicated in the MTO, the splash countdown appears in lower portion of display. |
| Battery FDC/BCS | 10F. Battery FDC passes "designate" to FO for Copperhead mission. | Battery FDC changes SPLASH to DESIG in the FM;FOCMD. FDC transmits this command immediately after firing. |
| FO/DMS | 11. FO passes corrections to battalion FDC. | FO passes subsequent corrections or EOM to battalion FDC. |

Figure 4-7 (continued). Special Mission Processing Steps in Centralized Mode

4009. Special Procedures

a. Final Protective Fires

FPFs must be processed using the work-around shown in figure 4-8 because of software incompatibilities in the BCT/LCU program.

| ACTION | REMARKS |
|--|---|
| 1. FO - Transmit a digital request to establish FPF. | FO sends SYS;PTM requesting an adjusted or unadjusted FPF. |
| 2. Battalion FDC - Associate FO with a fire unit. | Use FM;QF with option UPDATE to associate desired fire unit and FO. |
| 3. FO - Transmit FR . | Compose FR using any method of target location. Enter the following — <ul style="list-style-type: none"> • TGT LOCATION • SIZE = [1] 30 meters per number of pieces in 105mm fire unit; 50 meters per number of pieces in 155mm fire unit [2] enter 50 • ATTITUDE enter attitude of FPF SHEAF, 0-3199 mils. • PRIORITY - assign FPF. NOTE: For an adjusted FPF, go to step 4; for an unadjusted FPF go to step 10. |
| 4. Battalion FDC - Process call for fire. | Battalion FDC processes FM;CFF . Ensure SIZE [2] is less than 1/5 of SIZE [1] . For a 105mm FPF, the FDC must modify the entry because the smallest entry the DMS can transmit is 50 meters. |
| 5. Process the adjustment. | Adjustment is processed as any area fire mission. |
| 6. FO - Transmit refinement. | FO transmits SYS;PTM with TGT: _____ , REFINEMENT FOLLOWS . Refinement is then transmitted in SUBS ADJ message. |

Figure 4-8. Mission Processing Steps for FPF

| ACTION | REMARKS |
|--|--|
| 7. Battalion FDC - Process refinement. | Enter DNL as method of engagement and DO NOT FIRE in PTM field of FM;SUBS. Transmit to battery FDC. (This step is required because the BCT is designed to store targets and transmit EOM. Refinement is lost at the BCT if EOM:YES is specified.) |
| 8. Battery FDC - Process refinement. | Battery FDC observes DNL and PTM and executes refinement to move aimpoint to refined location. |
| 9. FO - Transmit "end of mission." | FO transmits EOM&SURV with EOMRAT. NOTE: FPF can be fired by FO sending FM;QF requesting FIRE FPF or fired by the BCT operator using the FPF switch. Command will process automatically at the BCS and transmit to GDUs without operator action at the BCS. |
| 10. Battalion FDC - Process fire request to establish FPF. | FM;CFF is processed as if it was an adjusted FPF. FM;CFF:O is modified so that the method of control is changed to DNL, and PTM field is entered with DO NOT FIRE. FM;CFF:O and FM;MTO are transmitted. |
| 11. Battery FDC - Process the FM;CFF. | Battery FDC executes the FM;CFF:O but does not transmit the fire commands to the GDU. |
| 12. FO - Transmits "end of mission." | FO transmits EOM&SURV message with EOMRAT after receiving the MTO for the target. |

Figure 4-8 (continued). Mission Processing Steps for FPF

b. Registrations

Registrations are important to both FDCs and FSCCs. Because the conduct of a registration cannot be controlled through the BCT or LCU, a link between the observer(s) and the battery FDC must be established, and the following events must occur:

- (1) The battery OpsChf/FDO requests, or the battalion OpsChf/FDO decides, to register.

- (2) The battalion OpsChf/FDO selects the method of registration, observer(s), shell, charge, propellant, and fuze to register.
- (3) Communications with the observers is established. Preferably, an observer is selected who is on the same COF net as the battery. If the observer is on another net, the battalion FDC will establish the appropriate communications relay.
- (4) The battery FDC conducts the registration.
- (5) The battery FDC passes the registration corrections to the battalion FDC, where they are examined and passed to the battalion's batteries.
- (6) The battery FDC that conducted the registration is responsible for **MET**, **MV**, or survey updates of the **AFU;REG**. Updated **AFU;REGs** are transmitted to the battalion FDC.

NOTE: The method of registration depends on the available resources and tactical environment. The following considerations apply:

- Registration firing does not damage the enemy directly and possibly discloses the firing position.
- Radar registration is fast, requires few rounds, and is very reliable. It is also dependent upon the proficiency of the radar operator and battery FDC.
- High burst (HB) and mean point of impact (MPI) registrations require two observers equipped to measure the vertical angle to each burst. No surveyed registration point is required.
- Precision registration requires only one observer but also requires a surveyed registration point on common survey with the registering battery, and preferably the battalion.
- Abbreviated registration (precision registration procedures with less than two over and two short spottings and four airburst spottings, or radar/HB/MPI procedures with less than six usable rounds) can be used to shorten the registration if diminished assurance of validity is acceptable.

Lot to be registered, like all matters of technical fire direction, is left to the battery FDC. The registered lot should have an accurate muzzle velocity variant (MVV) on file or ready to be measured, to allow transfer of the **AFU;REG** to other unit. For a more complete explanation of registrations, see FMFM 6-22/TC 6-40, *Field Artillery Manual Cannon Gunnery*.

c. Replot

(1) Explanation. Replot is required to mass fires in mountainous terrain. The replot procedure eliminates site error. This error occurs when the altitude determined at the initial target location varies from that at the actual target location. This error is corrected as an elevation correction, vice site correction, during adjustment. This displaces the adjusted target location in range. Since site (the actual error) varies with range, the unadjusted massing units suffer an error in point of impact equal to the error in site.

(2) **Procedure.** BCT/LCU software is not designed to allow for the performance of replot. However, the BCS will perform replot based on successive approximation. The following procedure allows replot to be performed at the direction of the battalion FDO/OpsChf.

| ACTION | REMARKS |
|---|--|
| 1. Battalion FDC processes adjustment phase of area fire mission. | During adjustment, the decision is made to replot. |
| 2. FO transmits an FM;SUBS requesting fire for effect. | Battalion FDC discards all segments of the fire mission chain except the FM;CFF:O for the adjusting battery. Method of control is changed to DNL and PTM:REPLOTT is entered. FM;CFF:O is transmitted to battery FDC. |
| 3. Battery FDC processes the replot. | <p>BCS operator notes the PTM: field. Replot is processed on the adjusted location.</p> <ul style="list-style-type: none"> • Conduct replot until two successive target altitudes are determined within one half the contour interval of the map. • Execute the FM;CFF with the final altitude, REPLOTT:X, and record the target location and altitude. BCS transmits EOM to GDUs as soon as replot FM;CFF is executed. This does not stop processing. Fire for effect or repeat fire for effect appears as a new mission to GDUs. • Execute EOM to store target. • Select target FM;CFF from data base, enter fire order entries from the mission, CONT:DNL/FFE, and execute. • Transmit FM;CFF to battalion FDC. • Transmit DNL fire commands to guns. |
| 4. Battalion FDC processes fire for effect on replot grid. | <p>Battalion FDC BCT operator notes reception of replot FM;CFF and —</p> <ul style="list-style-type: none"> • Deletes fire mission from fire mission file by use of FM;COMD message. • Enters fire order entries and executes FM;CFF received from battery FDC. Fire mission chain reflects same mission number but in form of FM;CFF. • Converts FM;CFF mission chain to FM;SUBS acceptable to BCSs by executing FM;SUBS with no correction. This produces fire mission chain to mass on replot grid. |

Figure 4-9. Message Processing Steps for Replot

4010. Fire Mission Processing at Regimental FDC

The **FM;CFF:X** received at regimental FDC will not process if recalculated. The following procedures will be used.

- a. The **FM;CFF** is entered as **DISPLAY:YES** in the PCLD of the regimental FDC's BCT.

- b. Received fire missions are plotted. A voice fire order is issued and appropriate entries are made in the **FM;CFF**.

- c. The **FM;CFF** is actioned and the solution is transmitted to the battalion FDCs.

(reverse blank)

Chapter 5

Artillery Target Intelligence

5001. General

The **ATI** program allows the **BCT/LCU** to manage the target file for the purpose of counterfire and fire planning. The **ATI** function provides for the following:

- Storage, search, and retrieval of targets.
- Elimination of duplications in the target file by combination.
- Input of fire mission criteria to generate fire missions on high payoff targets (**HPTs**).
- Rejection of targets older than established set time criteria.
- Predicted hostile weapons locations based on intersections of rays generated by shell reports.

5002. Modes Of Operation

The **ATI** program provides for a **BCT/LCU** to be established in one of three modes of operation. The mode may be altered at any time during operations should the situation require it.

a. **ATI MODE 1**

Operations in this mode are the most limited of the modes. The computer can input **ATI** reports of targets or enemy activity, search the target files of another **BCT/LCU**, and establish **SRI**s. Received **ATI** reports are stored at the computer only if they are marked **RECORD AS TARGET**.

b. **ATI MODE 2**

Operations in this mode provide the same capabilities as **ATI MODE 1** except any **ATI;CDR**, **ATI;SHR**, **ATI;AZR**, **ATI;MFR**, or **AFU;MFR** are automatically transmitted to the default address when these messages are actioned.

c. ATI MODE 3

Operations in this mode allow complete ATI processing. All ATI reports are stored as targets.

5003. Concept of ATI Operations

The **ATI MODE 3** function allows the computer to maintain a data base of targets. Because the program also combines targets and generates fire missions, it is inefficient and redundant to store the targets in each BCT/LCU. Only three stations will operate in **ATI MODE 3**. These are the MAGTF FFCC, the ground combat element (GCE) FSCC, and the TPC. The MOI setup detailed in chapter 2 causes **ATI;CDRs**, **ATI;AZRs**, **ATI;MFRs** and **AFU;MFRs** to be forwarded to the GCE FSCC when received and entered at any station. The target file for the entire force is resident at the GCE FSCC. The MAGTF FFCC stores those targets that are forward of the fire support coordination line (FSCL). The TPC and regimental FDC establish SRIs to receive counterfire targets (i.e., **ARTY/NOT GIVEN**, **MORT/NOT GIVEN**, **RKTMSL/NOT GIVEN**, **SUPPLY/AMMO**, **EQUIP/RADAR**, and **PERS/O**) with target storage at the TPC. **ATI;SHRs** transmitted through the system are routed to the TPC as a result of MOI and **ATI MODE 2** processing at subordinate stations.

5004. Establishing Automated Target Processing Criteria

To ensure efficient functioning of the ATI system, it is imperative that proper modification file criteria is established to support the commander's concept of operations. Appendix D contains a detailed explanation of the procedures used to translate the products of the targeting process into numerical values for the ATI mod file.

a. ATI Criteria at the GCE FSCC

Much of the ATI criteria are dependent upon the tactical situation. Some specific entries are required in all situations.

(1) The **ATI;FMMOD** message controls the output of fire missions from the ATI function. The division FSCC makes the following specific entries:

(a) **INITIATE FIRE MISSION BASED ON: ALL TGT RPTS** causes the computer to examine all incoming **ATI** reports (except **ATI;MFR**, **ATI;SVL**, and **ATI;CBTI**) as possible fire missions.

(b) The remaining entries in the **ATI;FMMOD** message are based on the tactical situation.

(2) The **ATI;SVMOD** message controls the combination of targets and the time criteria for rejection of target data. All entries are mission and situation dependent.

(3) **ATI;TBMOD** controls the output of **TARGET BUILDUP REPORTS**. The target buildup report indicates intense enemy activity. The number of targets constituting a buildup are entered in the **ATI;TBMOD** message based on the tactical situation.

(4) **ATI;DPMOD** controls the output of less important printed reports. Reports critical to **ATI** operation (e.g., combination reports, search reports) are not controlled by the **DPMOD** message. Specific reports are printed at the supervisor's discretion. If the system is overloaded with printer output, this may be progressively reduced by not printing certain reports. The following is an ordered list for reduction of printer output:

- **IN FAN** reports
- **INCOMPATIBILITIES** reports
- **RECOMMENDED FOR INSPECTION** reports
- **RECOMMENDED FOR COMBINATION** reports
- **CONSTITUENTS** reports

(5) The **ATI;STAT** message allows the computer operator to alter the report accuracy, and range and location error tables for target acquisition agencies. This message should not be used unless experience indicates a particular type of target acquisition agency has a capability different from that indicated in the default accuracy or error tables.

b. ATI Criteria at the TPC

The **ATI** modification file data at the TPC is identical to that established at the GCE FSCC, except for the following.

(1) The **ATI;FMMOD** message **INITIATE FIRE MISSION BASED ON: SOLUTION REPORTS ONLY** prevents the TPC computer from duplicating a fire mission generated at the division FSCC when the same report is received by the TPC via SRI. Only those targets that combine with existing targets and meet the **FIRE MISSION CRITERIA** will generate a fire mission.

(2) The **ATI;DPMOD** list is ordered as follows for reduction of printer output:

- **INCOMPATIBILITIES** reports
- **RECOMMENDED FOR INSPECTION** reports
- **RECOMMENDED FOR COMBINATION** reports
- **CONSTITUENTS** reports
- **IN FAN** reports

5005. Target File Maintenance

The BCT/LCU will store 2000 targets. To maintain a manageable target file, targets must be deleted as appropriate. The GCE FSCC and TPC are the managers of the target file and are responsible for performing target file maintenance. Although the storage capability of the BCT is extensive, it is possible to degrade system functions by inundating the memory. To preclude overextending the memory capabilities of the system, continuous and thorough file maintenance must be performed. Targets are deleted from the target file using **ATI;TGR** or **ATI;SRCH** formats. The following parameters serve as a guide to determine when targets should be deleted.

- a. Delete targets as directed by the artillery regimental commander or his representative.
- b. Delete the constituents (those targets that made up the solution) after automatic combination if the combination is acceptable.
- c. Review each **RECOMMENDATION FOR COMBINATION** and **RECOMMENDATION FOR INSPECTION** report. When the recommendation is valid and accepted, the targets are manually combined using the **ATI;COMB** format and a new target number is assigned. The constituents are deleted.
- d. Delete all fired targets with a disposition of destroyed.

- e. Delete all other fired targets older than two hours.
- f. Delete all **ARMOR** targets older than one hour during defensive operations.
- g. Delete other target reports periodically as required. Experience must be used to determine when to delete those categories. For planning purposes, targets older than four hours should be deleted.

5006. Control of Field Artillery Radars

a. Missions

Artillery radars may be assigned either in GS or DS of artillery units. Artillery radars function in one of two missions and in one of two modes.

- (1) Radar sections in GS are centrally controlled by the artillery regimental S-3 and support the artillery regiment as a whole.
- (2) Radar sections in DS are attached to or placed under the operational control of an artillery battalion or battery.

b. Modes

Artillery radars operate either in the hostile fire mode or friendly fire mode.

- (1) The hostile fire mode is the principal operating posture for artillery radars. In this mode, radars locate hostile artillery, mortars, and rockets, and predict the point of impact as well as the firing weapon's location.
- (2) The friendly fire mode allows the radar to be used to register friendly fire units. This mode can be manipulated to use the radar for adjustment of fires; *however*, the radar computer software is not designed to process adjustments and these missions must be done using voice communications.

c. Radar Zones

Radars are normally assigned a GS mission and operate in the hostile fire mode under the control of the artillery regimental TPC. The TPC assigns each radar a sector of search using the **SPRT;SEARCH** format. Each sector

of search is approximately half the division frontage in width and extends from four kilometers behind the FLOT to the far end of the division's zone or to the maximum range of the radar. Within this sector the TPC normally assigns (using the **SPRT;FILTER** format) four types of zones. The type of zone determines how the radar handles detections of trajectories originating or terminating within the zone.

(1) Call for Fire Zone (CFFZ). The CFFZ is established within the sector of search beyond the coordinated fire line (CFL) and extends to the maximum range of the Q-36.

(2) ATI Zone (ATIZ). The ATIZ is established within the sector of search between the minimum range of the Q-36 and the CFL.

(3) Critical Friendly Zone (CFZ). CFZs are established around friendly forces or areas that the GCE considers critical to the success of the operation; e.g., division combat operations center, supply areas.

(4) Censor Zone (CZ). CZs are established around friendly units within the search sector to prevent targeting these units.

5007. Counterfire

Counterfire is the attack of the enemy's indirect fire support resources. The location and suppression of these weapons is essential for maneuver elements to have success on the battlefield. A single attack of a counterfire target may not achieve lasting suppression; therefore, multiple sensings of the same target may be received and multiple engagements may be required. Counterfire is not an end in itself, but another form of fire support for the division. Priorities for engaging counterfire targets are based on the criticality of the maneuver situation and the reliability of the source reporting the target. The BCT/LCU does not prioritize fire missions; therefore, the FDC and the TPC must constantly review incoming fire missions and ATI reports to attack the highest priority targets first. The execution of counterfire is one of the primary missions of the artillery regiment and controlling the counterfire effort is one of the primary concerns of the artillery regiment staff and the TPC.

a. Counterfire Posture

The commander assigns a counterfire posture and guidance for the attack of counterfire targets. The guidance indicates whether counterfire targets are attacked immediately or planned in a program of fires. Additional specific guidance may be provided for different types of counterfire targets.

b. Counterfire Planning

Counterfire planning techniques include traditional counterfire planning, on-call counterfire programs, and immediate counterfire.

(1) Traditional Counterfire Planning. Traditional planning involves developing target lists, scheduling fire units, and firing the program on a time schedule. A division operations order for a major offensive or defensive operation includes counterfire targets to support the maneuver portion of the operation. Additional targets are developed according to the GCE commander's guidance for the operation. The TPC will cooperate with the artillery FDC in developing the counterfire program. The fire plan will be named in accordance with appendixes B and C except that numerical sequence of the counterfire program begins at 3 (1 and 2 are reserved for on-call counterfire plans).

(2) On-Call Counterfire Programs. On-call counterfire programs are prepared and fired in response to an operational situation. The artillery FDC and its subordinate battalions will habitually maintain two permanent counterfire programs. These programs are named counterfire plan 1 (CF1) and counterfire plan 2 (CF2). (See appendixes B and C for naming of fire plans.) AFU and SPRT will always be current for these plans. The TPC, in conjunction with the artillery regimental S-2, is responsible for developing the target lists using the following steps.

(a) Targeting for these programs depends on the operational situation. If all counterfire targets are fired immediately, no targeting for the programs will occur. If the tactical situation dictates, or ammunition constraints prohibit engaging counterfire targets as they are developed, targeting will occur for the programs.

(b) Targets will first be selected for plan **CF1**. In the absence of other guidance, the program will include all artillery, mortar, medium and heavy rockets and missiles, and personnel/observation post (OP) target types; both those fired and unfired; that are not more than 2 hours old; and that have a report value (RV) of 100 or less. The TPC is responsible for developing the counterfire target list. The TPC transmits the preliminary target list to the regimental FDC. The regimental FDC schedules the fire plan, coordinates with the appropriate FSCC, and transmits the targets in the schedule of fires (**TISF**) to the subordinate battalion FDCs.

(c) As soon as the TPC sends the preliminary target list to the regimental FDC, targeting begins for **CF2** using the same criteria as in paragraph 5007b(2)(b) above. Once **CF2** is complete and the **TISF** sent to the battalions, the regimental FDC deletes **CF1 TISF**, **FPTGT**, and **FPLST**.

(d) The TPC begins retargeting for **CF1**.

(e) In this manner, a current on-call counterfire plan is always available. New plans should be developed and transmitted hourly.

(f) When developing a list of targets for **CF1** and **CF2**, system processing can bog down with excessive **ATI;PREFPs**. The following procedures should be used when developing a list of targets.

- TPC uses the **ATI;SRCH** format to perform a Level 1 search of the TPC's target file. In the absence of other guidance, the criteria established in paragraph 5007b(2)(b) above should be used. If the total number of targets is excessive, further restrict search criteria and search the target file again. Continue restricting criteria until an acceptable number of targets for a list of targets is obtained.
- Using the same search criteria that produced an acceptable number of targets, perform a Level 2 search of the TPC's target file. A Level 2 search yields a one line summary of a target. Analyze this list for duplications and possible deletions.

- After ensuring that the regimental FDC has a fire plan file built and is ready to receive targets, the TPC enters an **ATI;PREFP** format with the same search restrictions as in the preceding step with the regimental FDC logical name in the **TO** field. The results in the preliminary target list being transmitted to the regimental FDC are in the form of **NNFP/XTGTs**.

(3) Immediate Counterfire. Firing selected targets in a particular area of the battlefield in response to a maneuver request is immediate counterfire. Requests for immediate counterfire from maneuver elements can be handled in one of two ways. Either **CF1** or **CF2** can be executed (if being used), or targets in one or more of the counterfire reference grids (**CRGs**) may be fired. If the **CRG** is used to designate fires, then the artillery **S-2s** must have accurate and current target maps to check which targets fall in the **CRG(s)** and provide targets immediately to the **FDO**. Alternatively, the **TPC** may search the **CRG** (by rectangular search) and provide counterfire targets to the regimental **FDO** for assignment to battalions.

c. Fire Support Coordination of Counterfire Targets

It is the responsibility of the regimental **FDC** to perform proper coordination of the counterfire plan with appropriate **FSCCs** prior to transmitting the plan to the battalion **FDCs**. To accomplish this coordination, the **TISF** is transmitted to the division **FSCC** for review. Division **FSCC** will transmit a **SYS;PTM** indicating approval of the **TISF** and/or any targets not cleared.

5008. Fire Missions Generated by the ATI Function

The division **FSCC** or the **TPC** computer may generate fire missions from **ATI MODE 3** operation. In addition, the **Q-36** radars may generate missions resulting from **CFFZs** or **CFZs**.

a. TPC Actions

(1) The **TPC** immediately sends every target received as a **FM;CFF** from the radars to the regimental **FDC** for engagement.

(2) The TPC will automatically initiate a fire mission when incoming **ATI** reports present a suitable target based on the criteria entered in the **ATI;FMMOD** message. If an incoming **ATI** report from a Q-36 generates a combination report with one or more single targets or a target solution, and *any* of the constituents has been fired, *do not fire* on the solution unless examination of the date-time groups (DTGs) of the reports indicates a new target. If the same incoming **ATI** report generates a combination report with one or more single targets or a target solution, and *none* of the constituents has been fired, *fire* the solution.

b. Senior GCE FSCC Actions

The GCE FSCC generates fire missions on HPTs from **ATI MODE 3** processing. Fire missions are transmitted to the FDC only if the target is a HPT (because of the nature of the **ATI;FMMOD** entries, some targets that match the fire mission criteria may not be in compliance with the HPT list) *or* if the attack guidance matrix indicates that the target is to be attacked by artillery. If the target meets neither criteria, pass it to an appropriate agency or use a **NNFP;FPTU** message to place the target in the appropriate plan file for future attack in a fire plan.

c. Mission Flow

Figure 5-1 describes the processing of an **ATI MODE 3** generated fire mission.

(1) Both the TPC and the division FSCC create a **FM;CENTER** file for all fire units under the regimental FDCs name. This is a **FMMOD** file requirement.

(2) Both TPC and the division FSCC enter the regimental FDC as the default address in the **COMM, SUBSCRIBER** menu.

(3) A false observer **10** should be used in the observer file. The FSCC or TPC location should be used as the observer location. This is required since the BCS will not generate **FM;FOCMDs** if no observer is specified.

| STEP | AGENCY | ACTION |
|------|----------------------|---|
| 1 | Division FSCC or TPC | Receives an ATI report that causes a fire mission to be generated. FM;CFF is printed with a fire mission chain. Since no fire units are available, fire mission is addressed to the default address, the regimental FDC. |
| 2 | Division FSCC or TPC | Examines the target. Determine if the target is a HPT and if the target is to be attacked by artillery. |
| 3 | Division FSCC | For missions generated at division FSCC that require clearance, readdresses FM;CFF and transmits it to appropriate regimental FSCC for steps 3a through 3c. If clearance is not required, go to step 4. |
| 3a | Regimental FSCC | Automatically solves received FM;CFF and generates a FM;CFF due to FM;CENTER file processing. FM;CFF is readdressed and transmitted to appropriate battalion FSCC. |
| 3b | Battalion FSCC | Clears or denies the mission by transmitting SYS;PTM:___ [target number] CLEARED (or DENIED) to regimental FSCC. Battalion FSCC then uses the FM;COMD message to delete the fire mission. |
| 3c | Regimental FSCC | Retransmits SYS;PTM to division FSCC and then uses the FM;COMD message to delete the fire mission. |
| 4 | Division FSCC or TPC | Enters observer 10 in the FM;CFF and transmits the mission to regimental FDC. |
| 5 | Regimental FDC | If the mission is from the TPC, coordinates mission as required by requesting clearance from division FSCC. (If clearance is required, the FM;CFF is readdressed and transmitted to division FSCC.) Ensures that OB:10 is entered in the FM;CFF and transmits FM;CFFs to battalion FDC. |
| 6 | Battalion FDC | Processes fire mission and transmits to battery FDCs. |
| 7 | Battery FDC | Processes mission. Transmits FM;FOCMD SHOT and RDCOMP which are automatically addressed to battalion FDC. At each level the FOCMD is automatically retransmitted until it is received at the division FSCC or TPC that originated the mission. |
| 8 | Division FSCC or TPC | Upon receipt of FOCMD RDCOMP, completes and enters FM;SUBS for the target with EOM:YES. This clears the mission from the buffers in all the computers. |

Figure 5-1. ATI MODE 3 Fire Mission Processing

5009. Dissemination of the Target List

a. Manual Versus Automated Targeting

Manual targeting is accomplished by nominating targets to each unit's list of targets. At each echelon, the lists of targets are resolved for duplications, then forwarded to the next higher echelon. The GCE FSCC resolves all lists and disseminates those targets accepted as the target list. Automated targeting follows a very similar track. Targets are nominated, starting at the maneuver company's FO, by use of the **ATI;CDR** or **ATI;AZR**. These are retransmitted to the GCE FSCC via **MOI** and **ATI MODE 2** processing. The targets are not recorded at the echelons below the GCE FSCC since the resolution of duplications has not yet occurred. At the GCE FSCC, duplications are resolved automatically by **ATI MODE 3** processing.

b. Dissemination of the Target List

Once target nominations are received by the GCE FSCC, automatic resolution of duplications occurs. The target list is maintained and managed by the GCE FSCC. Dissemination of the target list is accomplished as an ongoing and continuous process. Targets are automatically transmitted by **SRI** processing to the regiment in whose zone the target plots. These targets are further disseminated by **SRI** processing to the battalion FSCC in whose zone the target lies. Each update or deletion action taken at the division FSCC is transmitted to the subordinate FSCC to accomplish file maintenance and to ensure that the same target data is maintained at all levels.

Chapter 6

Fire Planning

6001. General

There are five methods of fire planning used in MCFSS:

- Counterfire planning
- Combined effort fire planning
- Quick fire support planning
- FASCAM fire planning
- MEU Operations Mode fire planning

6002. Counterfire Planning

The artillery regiment or battalion FDC, in conjunction with the TPC, is responsible for developing and scheduling counterfire plans. The fire planning sequence in applicable BCT/LCU technical manuals (TMs) is used with the following exceptions.

a. Coordinating Targets

Prior to entering a target that violates a restrictive FSCM on to the fire plan preliminary target list (FPLST), the artillery FDC must obtain approval from the GCE FSCC.

b. Obtain Division FSCC Approval

Prior to transmitting the fire plan to the battalion FDCs, the artillery FDC must send the TISF to the GCE FSCC for approval.

c. Fire Planning Sequence

Figure 6-1 provides the modified fire planning sequence used to prepare a counterfire plan.

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|--|---|------------------------|---|
| 1-R | Establish NNFP modification file at the TPC. | NNFP;ATTACK NNFP;COMD NNFP;FUSEL NNFP;MOD NNFP;XCLUDE | NNFP;4221 | Alerts the FDC to build the modification file and transmits changes to the FDC. |
| 2-O | Review NNFP modification file. | NNFP;COMD | NNFP;4221 | Used to review modification file for fire plan and to ensure changes made in step 1 are reflected. |
| 3-R | Establish related files. | AFU;BUILD SPRT;BUILD | AFU;2203 SPRT;7202 | Associates batteries and geometry from current plan with fire plan. |
| 4-O | Review batteries and geometry. | AFU;COMD SPRT;COMD | AFU;2203 SPRT;7201 | Omitted unless changes were made to geometry or AFU data in step 3. |
| 5-R | Develop FPLST (fire plan preliminary target list). | ATI;PREFP NNFP;FPTU | NNFP;4211 | TPC enters ATI;PREFP message for a count of targets. Search criteria is adjusted until acceptable number of targets is determined. Acceptable search criteria is entered again for level 3 search. FPLST is created and printed. TPC reviews FPLST and adds or deletes targets as required using NNFP;FPTU message. |
| 6-O | Review FPLST. | NNFP;COMD | NNFP;4211 | Performed if original FPLST in step 5 was altered. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-1. Counterfire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|-------------|---|-------------------------|--|--|
| 7-R | Transmit FPLST to the FDC. | NNFP;COMD | | TPC transmits FPLST to FDC. NNFP;4211 FPLST prints at FDC when entire list has been received. |
| 8-R | Develop fire plan (FPTGT) and on-call target list (ONCALL). | NNFP;INST | | Must be performed by FDC on all targets. Entries override modification file except MAX VOLS. |
| 9-R | Print FPTGT or ONCALL. | NNFP;COMD | NNFP;4212 NNFP;4213 | FPTGT ONCALL |
| 10-C | Reserve fire units (RESFU). | NNFP;RESFU | | Only performed if fire units assigned to plan must fire scheduled, higher priority mission during the plan's execution. |
| 11-O | Review fire unit reservations. | NNFP;COMD | NNFP;4227 | |
| 12-C | Coordinate FPTGT. | NNFP;COMD SYS;PTM | | FDC advises GCE FSCC to build MOD FILE for plan. When FSCC reports ready, FDC transmits FPTGT to GCE FSCC. FDC receives changes/ approval to FPTGT from FSCC in SYS;PTM. |
| 13-R | Compute fire plan solution. | NNFP;COMFP | NNFP;4214 NNFP;4215 NNFP;4216 NNFP;4217 NNFP;4218 NNFP;4219 | Regimental FDC computes plan. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-1 (continued). Counterfire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|--------------------------------|--|---|---|
| 14-C | Modify computed fire plan. | NNFP;COMD NNFP;INST NNFP;FPA NNFP;COMFP | | Use of NNFP;INST or NNFP;FPTU messages require recomputation of fire plan. Delete TISF. Reinstruct. Minor changes. Recompute fire plan. |
| 15-C | Transmit warning order. | SYS;PTM | | Transmit to GCE FSCC to warn that TISF will be transmitted. |
| 16-R | Transmit TISF. | NNFP;COMD | NNFP;XTGT NNFP;XSCD | Send to GCE FSCC. FSCC must have fire units built in plan to receive complete TISF. |
| 17-R | Approve/modify fire plan. | NNFP;FPTU NNFP;INST NNFP;FPA SYS;PTM | NNFP;FPTU NNFP;INST NNFP;FPA SYS;PTM | Receive recommended changes to fire plan from GCE FSCC in a PTM. FDC makes changes to plan. |
| 18-R | Notify subordinate battalions. | SYS;PTM | | FDC directs subordinate FDCs to build MOD FILE, AFU, and SPRT files for PLAN name from current plan. |
| 19-R | Report ready. | SYS;PTM | | Subordinate FDCs report to FDC that they are ready to receive the fire plan. |
| 20-R | Transmit TISF. | NNFP;COMD | NNFP;XSCD NNFP;XTGT | Transmit to subordinate FDCs; TISF prints when received complete. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-1 (continued). Counterfire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|-------------|--|-------------------------|-------------------------------|--|
| 21-R | Transmit fire plan to battery FDCs. | NNFP;EXECFP | NNFP;CFF | Battalion FDC transmits NNFP;CFFs to battery FDCs. |
| 22-R | Execute fire plan. | SYS;PTM | | GCE FSCC sends order to execute fire plan to FDC. |
| 23-R | Regimental FDC passes H-hour. | SYS;PTM | | Transmits to battalion FDCs. |
| 24-R | Battalion FDC passes H-hour. | SYS;PTM | | Transmits to subordinate batteries. |
| 25-R | Battery FDC fires plan. | BCS;COMD | FM;CFF | Battery FDC enters H-hour and executes. Fire plan targets are processed as computer generated time on target (TOT) missions. |
| 26-R | Transmit ammo update to battalion FDC. | AFU;AMMO:E; | | Batteries transmit to battalion FDCs. |
| 27-R | Purge plan. | NNFP;COMD | | Senior FDC purges plan and transmits NNFP;COMD:PURGE to all other stations. |

Step Legend: **R**=Required Step; **C**=Conditional Step; **O**=Optional Step

Figure 6-1 (continued). Counterfire Planning Sequence

6003. Combined Effort Fire Planning

The FSCC requesting the plan is responsible for the targeting and scheduling of the fire plan. The FDC that will execute the plan assigns fire units and computes the plan. The completed plan is submitted to the FSCC for approval.

a. Current Operations

A current plan is a plan that will be executed in the near future. No great change is expected in the current FSCMs (support geometry) and artillery fire unit (AFU) data from the time the plan is built until it is executed. During current operations, the AFU and SPRT files for the plan are copied from the current plan.

b. Future Operations

If a significant time lapse is expected between building and executing the plan, the plan is termed a future plan. If the plan is a future fire plan, the FSCC is responsible for the SPRT files and the FDC is responsible for the AFU files.

(1) The FSCC enters any future geometry and transmits this to the FDC. The FDC enters the geometry received.

(2) The FDC starts with the current AFU data for all fire units. When the plan targets are received, the FDC determines which fire units must be moved to support the plan. The fire plan is then computed at the FDC and transmitted to the FSCC for final approval.

c. Fire Planning Sequence

Figure 6-2 provides the modified fire planning sequence used to prepare a combined effort fire plan.

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|--|--|------------------------|--|
| 1-R | FSCC warns FDC to build modification file for future or current FP. | SYS;PTM | | FSCC indicates plan name and if plan is a current or future plan. |
| 2-R | FSCC and FDC establish NNFP;MOD file. | NNFP;COMD | NNFP;4211 | Both stations build modification file for PLAN name from current plan. |
| 3-O | FSCC modifies NNFP;MOD file. | NNFP;MOD NNFP;ATTACK NNFP;FUSEL NNFP;XCLUDE | | FSCC enters, and transmits to the FDC, desired changes to NNFP;MOD file. |
| 4-O | Review NNFP;MOD file. | NNFP;COMD | NNFP;4221 | Executed if NNFP;MOD was changed in step 3. |
| 5-R | Report ready. | SYS;PTM | | FDC reports modification file is complete to FSCC. |
| 6a-C | If plan is <i>current</i> plan, add support files to fire plan from current data. | SPRT;BUIL | SPRT;7202 | Both FDC and FSCC build support files at their computers. |
| 6b-C | If plan is <i>future</i> plan, add support files to fire plan. | SPRT;BGEOM SPRT;ZNE SPRT;COMD | SPRT;7201 | FSCC inputs future geometry into plan at its LCU and transmits to FDC. |
| 7a-C | If fire plan is a <i>current</i> plan, add fire unit files to fire plan from current data. | AFU;BUILD | AFU;2203 | Both FDC and FSCC build AFU files at their computers. |
| 7b-C | If fire plan is a <i>future</i> fire plan, add fire unit files to fire plan. | AFU;UPDATE AFU;AMMO AFU;COMD | | FDC inputs future fire unit location into plan at its BCT and transmits to FSCC. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-2. Combined Effort Fire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|-----------------------------------|-------------------------------------|------------------------|--|
| 8-O | Review fire unit/ geometry files. | AFU;COMD SPRT;COMD | AFU;2203 SPRT;7201 | |
| 9-R | FSCC develops FPLST. | ATI;PREFP NNFP;FPTU | NNFP;4211 | |
| 10-O | Alter FPLST. | ATI;PREFP NNFP;FPTU NNFP;COMD | | Major additions. Minor add/delete. Delete FPLST. |
| 11-R | Transmit guidance to FDC. | SYS;PTM | | FSCC transmits length of plan, length of phases, H-hour time or on-call and any coordinating instructions to FDC. |
| 12-R | FSCC develops FPTGT and ONCALL. | NNFP;INST | | Must be performed on all targets FSCC wants to schedule. Entries override modification file except MAX VOLS. Enter time relative to H-hour or phase. May make desired groups and series; enter munitions, volleys/effects. |
| 13-R | Print FPTGT or ONCALL. | NNFP;COMD | NNFP;4212 NNFP;4213 | FPTGT ONCALL |
| 14-R | FSCC transmits FPTGT to FDC. | NNFP;COMD | NNFP;4212 | Transmits each target as NNFP;XTGT and XSCD. Final target XTGT is transmitted twice, cueing receiving BCT that entire list has been received. Receiving BCT automatically prints FPTGT. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-2 (continued). Combined Effort Fire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|-------------|------------------------------------|---|--|--|
| 15-C | FDC reserves fire units. | NNFP;RESFU | | This step performed only if fire units assigned to plan must perform higher priority mission during execution of plan. |
| 16-O | Review fire unit reservations. | NNFP;COMD | NNFP;4227 | |
| 17-R | Compute fire plan solution. | NNFP;COMFP | NNFP;4214 NNFP;4217 NNFP;4218 NNFP;4219 | FDC computes plan. Use of NNFP;INST or NNFP;FPTU messages after this step requires recomputation of fire plan. If H-hour is known, it is entered in message. |
| 18-C | Modify computed fire plan. | NNFP;COMD NNFP;INST NNFP;FPA NNFP;COMFP | | Delete TISF. Reinstruct. Minor changes. Recompute fire plan. |
| 19-R | FDC transmits TISF. | NNFP;COMD | NNFP;XTGT NNFP;XSCD | Send to FSCC for approval. |
| 20-R | Approve/modify fire plan. | NNFP;FPTU FIREPLAN NNFP;INST NNFP;FPA SYS;PTM | NNFP;FPTU NNFP;INST NNFP;FPA SYS;PTM | Receive changes to fire plan from FSCC or PTM from FSCC approving fire plan. |
| 21-R | Notify subordinate battalion FDCs. | SYS;PTM | | Instruct to build AFU and SPRT files for PLAN name. |
| 22-R | Report ready. | SYS;PTM | | Subordinate battalions report that they are ready to receive fire plan. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-2 (continued). Combined Effort Fire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|---|------------------|------------------------|---|
| 23-R | Transmit targets in TISF. | NNFP;COMD | NNFP;XSCD NNFP;XTGT | Transmit to subordinate battalions. NOTE: Future fire unit locations and SPRT geometry need not be transmitted to battalion FDCs. Receiving computers do not need this information as computed TISF is complete and will not be recomputed. |
| 24-R | Transmit fire plan to battery FDCs. | NNFP;EXECFP | NNFP;CFF | Transmit to subordinate batteries. |
| 25-R | Fire the fire plan. | | | This step depends on how the plan was built. If H-hour was entered as plan was computed or executed, plan fires automatically. If fire plan was on-call, responsible FSCC transmits SYS;PTM with H-hour. |
| 26-R | Transmit ammo update to battalion FDC. | AFU;AMMO | | Batteries transmit to battalion FDCs. |
| 27-R | Transmit ammo update to regimental FDC. | AFU;AMMO | | Battalion FDCs transmit to regimental FDC. |
| 28-R | Purge plan. | NNFP;COMD | | As directed by the responsible FSCC. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-2 (continued). Combined Effort Fire Planning Sequence

6004. Quick Fire Support Planning

Quick Fire Support Planning is used when there is little time to prepare a formal plan. These are done in one phase applying the following procedure.

- a. A maneuver battalion commander desires a quick fire support plan. He requests permission of the regimental commander to plan the fires of his supporting artillery battalion.
- b. The request is approved by the regimental commander, and the artillery battalion S-3 is notified.
- c. A **SYS;PTM** is transmitted from the battalion FDC to the requesting battalion FSCC indicating the time span and units to be used for the hasty fire support plan.
- d. The requesting FSCC sends **SYS;PTM** to FDC telling them to build files for plan name; e.g., **QK31A6**.
- e. FDC builds desired fire units into plan name using **AFU;BUILD** format.
- f. FDC uses **SYS;PTM** to send ready to FSCC; e.g., **READY QK31A6**.
- g. FSCC computes fire plan using **NNFP;COMFP** format with the following entries:

PLAN:_____; [plan name]
HHOUR:00/00; [or specified time if not on call]
COMPUTE FIRE PLAN FOR:
FIRE PLAN + ON CALL + TGTS LEFT IN THE PRELIMINARY TARGET LIST
PHASE1:0/##; [For length, always start with the number of targets plus one. NOTE: May not exceed 60 minutes per phase, or 120 minutes per plan.]
- h. FSCC reads and reviews the **FPSUM**.
- i. FSCC transmits **TISF** with H-hour to the battalion FDC.
- j. Battalion FDC uses the **NNFP;EXECFP** format to transmit the fire plan to the battery FDCs, where it is executed.

6005. FASCAM Fire Planning

FASCAM fire planning is a cooperative effort between the requesting FSCC and the battalion or regimental FDC. The requesting FSCC obtains approval to fire FASCAM from the GCE FSCC and coordinates any violations of FSCMs with the establishing agency. The FDC schedules the fires and reports ready to the FSCC. The FSCC orders the execution of the fire plan. Figure 6-3 provides the modified fire planning sequence necessary to prepare a FASCAM fire plan.

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|--|--|--|---|
| 1-R | Obtain GCE FSCC approval. | SYS;PTM | | FSCC obtains approval/denial from GCE FSCC. |
| 2-R | Requesting FSCC sends warning order to FDC. | SYS;PTM | | Directs FDC to establish files for PLAN name. |
| 3-R | Establish NNFP;MOD file. | NNFP;COMD NNFP;MOD NNFP;XCLUDE NNFP;FUSEL | | If modifications not made, BCT/LCU uses CURRENT plan modification file. |
| 4-O | Review the NNFP;MOD file. | NNFP;COMD | NNFP;4221 | Update entries as required using messages in Step 3. |
| 5-R | Establish related files. | AFU;BUILD SPRT;BUILD | AFU;2203 SPRT;7202 | Associates batteries and geometry with fire plan. |
| 6-O | Review batteries and geometry. | AFU;COMD SPRT;COMD | AFU;2203 SPRT;7201 | |
| 7-R | Transmit ready. | SYS;PTM | | FDC reports ready to receive target. |
| 8-R | FSCC transmits target to FDC. FDC computes fire plan solution. | NNFP;FASCAM | NNFP;4214 NNFP;4217 NNFP;4219 NNFP;4228 SPRT;BGEOM | FDC enters NNFP;FASCAM. Use of NNFP;INST after this step requires recomputation of fire plan. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-3. FASCAM Fire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|-------------|--------------------------------------|---|--|---|
| 9-R | Transmit planned safety zone. | SPRT;BGEOM | | SPRT;BGEOM is automatically stored at FDC. |
| 10-O | Modify computed fire plan. | NNFP;INST NFP;FASCAM | NNFP;4214 NNFP;4217 NNFP;4219 NNFP;4228 SPRT;BGEOM | Used to replace fire units for specified target(s). Make changes to minefield parameters or include changes made by NNFP;INST. Also recomputes fire plan. Transmit new safety zone. |
| 11-C | Transmit minefield targets. | NNFP;COMD | NNFP;XTGT NNFP;XSCD | Regimental FDC transmits targets to battalion FDCs and requesting FSCC. |
| 12-R | Execute fire plan. | NNFP;EXECFP (Do not input H-HOUR or PHASE) | NNFP;4229 | FSCC sends to FDC. FDCs review NNFP;4229 and compare with NNFP;4228. |
| 13-R | Transmit fire commands to batteries. | NNFP;CFF | | SPRT;BGEOM:LFSZ is cued for transmission to FSCC. |
| 14-R | Transmit LFSZ. | SPRT;BGEOM | SPRT;BGEOM | LFSZ is stored by FSCC. It should be printed and manually plotted. |
| 15-R | Transmit ammo update to battalion. | AFU;AMMO | | Batteries transmit to battalion. |
| 16-R | Transmit ammo update to regiment. | AFU;AMMO | | Battalions transmit to regiment. |
| 17-R | Purge plan. | NNFP;COMD | | At the direction of requesting FSCC. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-3 (continued). FASCAM Fire Planning Sequence

6006. MEU Operations Mode Fire Planning

Because of the limited capability of the BCS to fire plan, this type of fire planning is accomplished at the battalion FSCC using the procedure set forth in figure 6-4.

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|---|--------------------------------------|------------------------|---|
| 1-R | Establish NNFP;MOD file. | NNFP;MOD | | FSCC builds modification file for the PLAN name. |
| 2-O | Review NNFP;MOD file. | NNFP;COMD | NNFP;4221 | |
| 3-C | If FP is for future operation, enter SPRT files for future locations. | SPRT;BUILD | | FSCC does not transmit these to battery FDC since BCS cannot store them. |
| 4-C | For future plan, FSCC approves battery locations. | SYS;PTM AFU;UPDATE with plan name | | FDC transmits SYS;PTM with future locations. FSCC transmits SYS;PTM approving or recommending changes. |
| 5-O | Review fire units and geometry. | AFU;COMD SPRT;COMD | AFU;2203 SPRT;7201 | |
| 6-R | Develop FPLST. | NNFP;COMD | NNFP;XTGT | |
| 7-O | Review FPLST. | NNFP;COMD | NNFP;4211 | |
| 8-O | Alter FPLST. | ATI;PREFP NNFP;FPTU NNFP;COMD | | Major additions. Minor add/delete. Delete FPLST. |
| 9-R | Develop FPTGT and ONCALL. | NNFP;INST | | Perform on all targets; entries override NNFP; MOD except MAX VOLS. |
| 10-O | Print FPTGT or ONCALL. | NNFP;COMD | NNFP;4212 NNFP;4213 | FPTGT ONCALL |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-4. MEU Operations Mode Fire Planning Sequence

| STEP | ACTION | RELATED MESSAGES | OUTPUT REPORT/ MESSAGE | REMARKS |
|------|---|--|--|---|
| 11-C | Reserve fire units. | NNFP;RESFU | | |
| 12-O | Review fire unit reservations. | NNFP;COMD | NNFP;4227 | |
| 13-R | Compute fire plan solution. | NNFP;COMFP | NNFP;4214 NNFP;4217 NNFP;4218 NNFP;4219 | Use of NNFP;INST or NNFP;FPTU messages after this step requires recomputation of fire plan. |
| 14-C | Modify computed fire plan. | NNFP;COMD NNFP;INST NNFP;FPA NNFP;COMFP | | Delete TISF. Reinstruct. Minor changes. Recompute fire plan. |
| 15-R | Transmit fire commands to battery FDC. | NNFP;CFF | | Transmit to battery with H-hour. If on-call, transmit command to fire as TOT later. (BCT/LCU transmits H:0/0; to BCS; BCS interprets H-hour as midnight; FSCC must notify FDC.) NOTE: BCS stores only 10 targets per plan. If more are transmitted, BCS operator changes name of plan beginning with 11th target and stores additional targets as second plan. |
| 16-R | Transmit ammo update to battalion FSCC. | AFU;AMMO | | Battery transmits to battalion FSCC. |
| 17-R | Purge plan. | NNFP;COMD | | At direction of FSCC. |

Step Legend: R=Required Step; C=Conditional Step; O=Optional Step

Figure 6-4 (continued). MEU Operations Mode Fire Planning Sequence

6007. MCFSS Fire Planning Hints

Fire planning with MCFSS consists of a standard sequence of procedures. These procedures should be done in order in accordance with the appropriate fire planning sequence outlined in this chapter.

a. Notes on Modification File Entry Messages

(1) Associate a zone established in the **SPRT** geometry file with each plan. The computer generates a warning every time a target in the fire plan is not located in that zone.

(2) If the **AFU;BUILD** message is used, the current **CSR (AFU;ASR)** will be built into the new plan including all current expenditures. To reset the expenditure counter to zero, enter the **AFU;ASR** message with **PLAN**, **WPN** or **FU** specified, and **ZERO** entered in the **EXPEND** field. This will zero the counter and retain the current **CSR (ASR)** level in the new plan. If a separate **CSR (ASR)** level is desired, it must be entered using a separate **AFU;ASR** input message.

b. NNFP;INST Input Message

Specific scheduling instructions for **FPLST** targets concerning **PRIORITY** and **PHASE** are specified using this message. Entries on this message can **OVERRIDE** all modification file criteria except fire unit exclusions and **MAXVOLS**.

(1) Normally, make no entry in **UFFE**, **EFF**, or **ANGLE** field when initially inputting a target. These mnemonics are most often used to resolve target exceptions and provide specific instructions for a specific fire unit.

(2) At a minimum, specify **PRIOR:4** (higher priorities may be used if desired) to prevent the **E&W "NO PRIORITY ENTERED - DEFAULT PRIORITY 4 USED"** from appearing for each target.

(3) For scheduled plans, a target that is to be fired in more than one phase must be reentered using a **NNFP;FPTU** format. This gives the target a new number from the **BCT** target block, effectively disguising it as a new target. This target is not recorded in the target file. Failure to follow these procedures will cause the **BCS** to overwrite the first target data when the repeat target is received with the same target number.

c. Changes in Fire Unit Status and Support Geometry

(1) Fire unit displacements and closings are received directly from the unit or via MOI. The AFU file for a plan must be updated to reflect changes in fire unit ready status, locations, azimuth of lay, etc.

(2) Geometry changes (e.g., FLOT, CFL) must be updated prior to computing the current plan to incorporate those changes. Changes made in the current plan are not automatically made in the fire plan.

d. Fire Plan Output Reports

(1) **NNFP;4218 Targets in the Schedule of Fires (TISF) Report.** The TISF report summarizes associated data for all targets in the fire plan. The scheduled targets are listed first, followed by on-call targets. The data provided for each target includes the location and description, zone in which the target is located, mission fired status (if previously engaged), any geometry, event time (e.g., based on H-hour), target priorities, phase data, desired and achieved effects or volleys, firing units assigned to the target, and shell and fuze to be used by each fire unit.

(2) **NNFP;4219 Fire Plan Summary Report (FPSUM).** The FPSUM identifies the warnings and exceptions generated during the computation of the plan. It also provides a summary identifying the total number of targets in the fire plan, the number of scheduled and unscheduled targets, and the total number of targets with warnings. Each target is listed, along with any warning and/or exception that is applicable.

(3) **NNFP;4217 Fire Plan Ammunition Report (FPAMMO).** The FPAMMO summarizes the ammunition required to execute the fire plan. The report lists ammunition required by shell and fuze for each fire unit.

(4) **NNFP;4214 Schedule of Fires Report (SCDFIRE).** The SCDFIRE provides scheduling results for each target and provides the status of each unit in the fire plan for the duration of the plan. A legend is provided at the beginning of the report which the fire planner can review.

e. Procedure for Reviewing the Fire Plan Output Report

(1) Review the **NNFP;4219 (FPSUM)** to determine which targets, if any, are listed as exceptions, and determine which targets, if any, have generated a warning. The targets listed as **EXCEPTIONS** must be resolved before they will be scheduled in the plan. **WARNINGS** on scheduled targets should be cleared through the coordinating **FSCC** (if not already done). Annotate the **FPSUM**, or record the target numbers for targets listed as capability or ammunition exceptions.

(2) Review the **NNFP;4218 (TISF)**. Note target exceptions. The **FPSUM** lists targets that are exceptions. The **TISF** lists the reason the target is an exception. **NOTE:** Before applying any new instruction, use the **NNFP;COMD** message to delete the **TISF**.

f. Reasons for Exceptions

The reason a target is listed as an exception can be misleading. A target that is an exception for more than one reason is assigned only one exception at a time in the following order: ammunition, capability, scheduling. For example, if a target is both a capability and scheduling exception it will be listed only as a capability exception on the initial computation. If removed, the recomputation will then list the target as a scheduling exception which would also have to be resolved in order to include that target in the plan. Also, a target for repeat fires is scheduled only once in a phase. It can be scheduled in all phases or in any combination of phases. If a target specified for repeat fires cannot be scheduled in any one of the requested phases, the target is noted as an exception and shall not be scheduled in any phase.

g. Solutions to Exceptions

Implement solutions listed in figure 6-5 and recompute the fire plan. It may take several attempts to develop an acceptable **TISF**.

| TYPE EXCEPTION | POSSIBLE CAUSE | SOLUTION |
|--|---|---|
| AMMUNITION EXCEPTION | <p>Insufficient ammunition to achieve required volleys or effects.</p> <p>None of specified type ammunition in file.</p> | <p>Verify ammunition. Decrease volleys or effects.</p> <p>Verify ammunition type. Select another ammunition type.</p> |
| CAPABILITIES EXCEPTION | <p>Not enough fire units available to defeat target.</p> <p>Out of range.</p> <p>Specified FU or WPN excluded.</p> <p>Specified VOL exceeds MAXVOL.</p> <p>Illegal SH/FZ combination.</p> | <p>Assign more FUs or decrease required VOL, EFF, or ECOF.</p> <p>Move FU or delete target</p> <p>Check modification files. Delete exclusions.</p> <p>Increase MAXVOL or lower required VOL.</p> <p>Verify legal entries.</p> |
| SCHEDULING EXCEPTION | Insufficient time available. | <p>Delete targets with exceptions. Increase phase length. Reschedule to another FU in another phase. Lower VOL or EFF.</p> |
| <p>NOTE: Any recommended solution that suggests changing commander's criteria must be approved by the FSCC requesting the plan.</p> | | |

Figure 6-5. Exception Solution Matrix

h. Eliminating Idle Time

(1) Idle time must be eliminated between phases by adding additional targets or by deleting that time.

(2) The SCDFIRE lists event times (e.g., based on H-hour). Recompute plans to remove idle time.

(3) The NNFP;FPA may be used during this step to modify or delete targets in TISF status. If the FPA is used do not recompute the plan. (FPAs are discarded when the plan is recomputed.)

i. Scheduling Groups and Series

(1) **Scheduling Exceptions.** The reason targets are listed as an exception may be misleading, because if any target in a **GROUP** (or **SERIES**) is an exception for any reason (e.g., capability, ammunition, or scheduling) the entire **GROUP** (or **SERIES**) is listed as a scheduling exception. Normally, targets are exceptions for one or any combination of the reasons listed below:

(a) Insufficient fire units available to engage all targets in the **GROUP**.

(b) One or more targets is out of range for all fire units, or not enough available fire units are within range to achieve the desired effects or volleys. (For targets out of range, no fire unit scheduling data will be shown on the TISF. Delete those targets from the plan.)

(c) Insufficient phase length specified on the NNFP;COMFP. (Increase phase length. This reason may also be a combination of the preceding two above; therefore, multiple reinstructs may be necessary to resolve all exceptions.)

(2) **Reviewing the NNFP;4219 (FPSUM).** Review the FPSUM to determine which targets, if any, are listed as scheduling exceptions.

6008. Scheduling a Target More Than Once in a Fire Plan

a. Problem

Use caution when scheduling a target in more than one phase. If the same battery is scheduled to fire the target, the BCS will overwrite the first NNFP;CFF when it receives the second NNFP;CFF. The third NNFP;CFF will overwrite the second and the fourth will overwrite the third. Thus, if the same battery is scheduled to fire a target in each of the four phases, the BCS will only fire it in the fourth phase.

b. Solution

The work-around to this problem is to assign a target location different target numbers for each time that the location is scheduled in the fire plan. Using this method, the number of times a target can be scheduled is increased to 99.

(reverse blank)

Chapter 7

Battlefield Geometry

7001. General Rules

- a. The FSCC that establishes the geometry is responsible for that measure. Two exceptions to this rule are that dead space areas are the responsibility of the establishing FDC, and that planned FASCAM safety zones (PFSZs) and LFSZs become the responsibility of the FSCC that requested the FASCAM mission.
- b. All geometry is named in accordance with appendix A.
- c. The third character of each six digit name is a sequential number assigned to the measure. Updates or deletions of points can be applied to established geometry. New geometry will be named using the next higher number.
- d. All linear measures that divide friendly and enemy sides of the battlefield must be entered with the points establishing the line numbered in ascending order beginning on the left of the friendly side.
- e. All area measures are entered with the left-rear point first (from a reference facing the enemy). The remaining points are numbered sequentially in a clockwise manner. The first point is not reentered as the last point.
- f. When new geometry is entered to replace an existing measure, the responsible FSCC enters a SPRT;COMD message to delete the existing geometry.
- g. Measures requiring an entry for the responsible fire support coordinator (FSCoord) field use a three character TAG as detailed in appendix B.

7002. Permissive Measures

a. Coordinated Fire Line (CFL)

Up to five CFLs per plan may be stored in the BCT/LCU for a total of 24. The management of CFLs may be accomplished in a number of ways, two of which include —

(1) The GCE FSCC may establish a single CFL with each subordinate maneuver unit assigned a number of points. When an update is required, the subordinate unit types the updated points into the SPRT;BGEOM and transmits the message to the appropriate FSCC without entering it. That FSCC either approves the new measure by entering and transmitting the updated measure to subordinate units, or disapproves the update by sending a SYS;PTM to the requesting unit.

(2) Each subordinate unit may establish its own CFL and update the measure as required. Not more than five CFLs can be stored per plan. If more than five units establish CFLs, each unit will store their own CFL and those of the adjacent units. Other received CFLs are plotted and discarded.

b. Fire Support Coordination Line (FSCL)

Only one FSCL per plan may be stored at the BCT/LCU. The GCE FSCC establishes and updates the FSCL.

c. Free Fire Area

MCFSS does not recognize free fire areas. When it is necessary to enter a free fire area, the agency establishing it will use the RFA format and name it FF vice RF in accordance with appendix A.

7003. Restrictive Measures

a. Restricted Fire Line (RFL)

Any FSCC possessing subordinate converging units may establish an RFL. Two RFLs per plan may be stored for a total of 24. The BCT/LCU warns any time a trajectory crosses the RFL. Though there is no friendly and enemy side of an RFL, its points are numbered in ascending order from left to right when facing the enemy from the perspective of the stationary force.

If both forces are moving, then the points are numbered from the perspective of the larger force.

b. Restricted Fire Area (RFA)

RFAs may be established as circular areas defined as a center and radius, or as an area defined by grids. The restricted ammunition may only be entered by type; e.g., **HE**, **CHEM**, etc. Ammunition entries are informational only. The computer warns any time a trajectory terminates in the **RFA** despite the ammunition fired.

c. No Fire Area

MCFSS does not recognize no fire areas. When it is necessary to enter a no fire area, the agency establishing it will use the **RFA** format and name it **NF** vice **RF** in accordance with appendix A.

d. Airspace Coordination Area (ACA)

ACAs are defined in MCFSS by two end points, a width, and a minimum and maximum altitude. All altitudes used will be converted to feet above mean sea level (MSL). The BCT/LCU cannot compute a technical solution for targets fired. This causes the computer to warn that an **ACA** *may* be violated if the trajectory crosses the box as plotted on the ground. The battery FDC must determine if actual trajectories pass through the **ACA**. This is accomplished at the BCS by the following steps:

- (1) Plot the **ACA**.
- (2) Determine the grid to the near corner of the **ACA**.
- (3) Determine firing data to that corner using the minimum altitude of the **ACA**. The quadrant elevation (**QE**) determined is the minimum **QE** for the **ACA**. If that point is also the **ACA** point furthest left or right from the battery's perspective, the deflection determined is one of the lateral limits of the **ACA**.
- (4) Determine the grid to the far corner of the **ACA**.

(5) Determine firing data to that corner using the maximum altitude of the **ACA**. The **QE** determined is the maximum **QE** for the **ACA**. If that point is also the **ACA** point furthest left or right from the battery's perspective, the deflection determined is one of the lateral limits of the **ACA**.

(6) The near and far **ACA** points may not also represent the left- and right-most points of the **ACA** from the battery's perspective. In this case, firing data must *also* be determined to the deflection limit(s) not represented by either the near or far **ACA** points as shown in figure 7-1.

(7) When a trajectory crosses the plotted **ACA**, the deflection and **QE** must be outside the limits established or a different charge/trajectory must be selected.

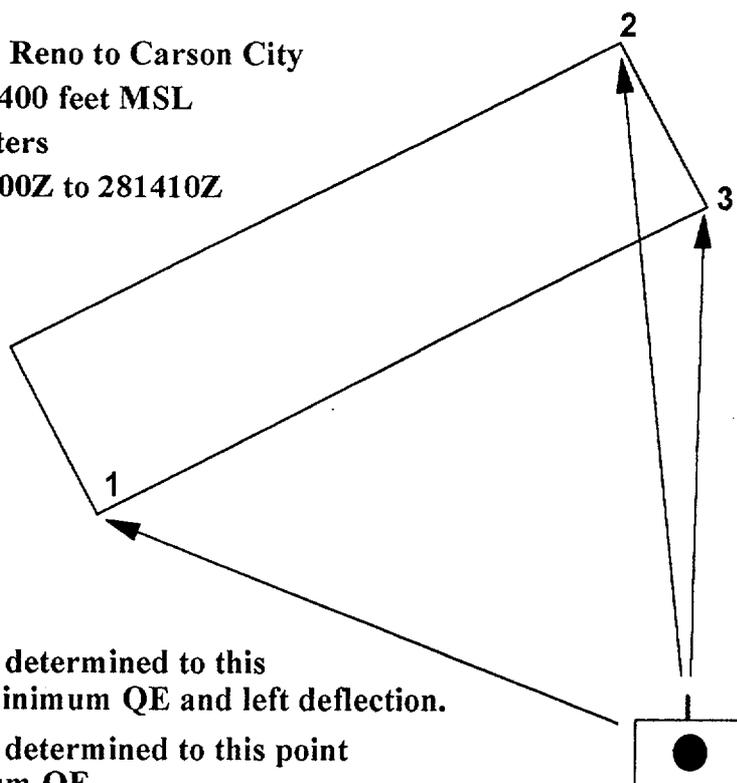
AC16MD

Control Points Reno to Carson City

Altitude 50 to 400 feet MSL

Width 500 meters

Effective 281400Z to 281410Z



1. Firing data determined to this point for minimum **QE** and left deflection.
2. Firing data determined to this point for maximum **QE**.
3. Firing data determined to this point for right deflection.

Figure 7-1. Selecting **ACA** Points for Determination of Firing Data

7004. Other Control Measures

a. Forward Line of Own Troops (FLOT)

FLOT messages transmitted by the DMS are received by the BCT/LCU in the alert queue. The computer operator must enter the plan name and the **FSCORD** fields to process the message.

(1) Precautions. The FSCC must guard against the following erroneous entries.

(a) Each FO can enter two points in the DMS **FLOT** message. The points must be given unique numbers increasing from left to right to properly orient the friendly side and prevent one reported point from over-writing another.

(b) Established **FLOTs** can be updated. However, if an observer or FSCC updates fewer points than were originally established, the points that were not updated remain in their original location.

(c) If point numbers are assigned to individual FOs, and the FO's supported unit changes position in the linear arrangement of the friendly frontage, the **FLOT** point numbers must be redistributed by the battalion FSCC.

(2) Methods For Controlling the FLOT Points. One of three methods may be used to define the **FLOT**. Each requires practice, and none are absolutely foolproof.

(a) Assign **FLOT** points to each FO. The observer reports and updates his point number to the battalion FSCC. The battalion FSCC assigns the **FLOT** name and monitors the **FLOT**.

(b) Have the observers report their **FLOT** points to the battalion FSCC. The battalion FSCC plots the points and numbers them. The received **FLOT** messages are then edited at the FSCC computer to assign the name and correct point number.

(c) In fluid situations, the battalion FSCC may rely on the flow of updated observer location messages passed from the FOs' DCTs to track the FLOT. Using this technique, the FSCC composes the SPRT;BGEOM message.

(3) Echelon at Which the FLOT is Established. The FLOT may be established down to the maneuver battalion level. However, the fact that the BCT/LCU stores only five FLOTs per plan must be considered. A more practical procedure is to establish the FLOT at the regimental level with each battalion allocated FLOT point assignments. In this method, each battalion enters the FLOT message using the regimental FLOT name and transmits only *its* points. The messages transmitted by the battalions automatically combine when received at the regimental FSCC to form a complete regimental FLOT. The complete FLOT is then transmitted to the battalion FSCCs.

b. Zone (ZONE)

Each maneuver unit down to the battalion level establishes and updates its zone of operations by entering sufficient grids to define its boundaries. The first point cannot also be the last because the computer connects the points to create a closed area.

c. Dead Space Area (DSA)

DSAs are those areas completely masked from a unit's indirect fires. The battery FDC reports DSA by SYS;PTM and grids. These are entered and disseminated from the battalion FDC. The battery FDC uses the following procedures to determine DSAs:

- (1) Determine possible DSAs behind prominent terrain by map inspection.
- (2) Compute the low angle QE with the lowest usable charge and the high angle QE with the highest usable charge along the top of the masking terrain feature. This is the near limit of the DSA.
- (3) Add range and plot the actual ground altitude at that range. Compute a QE to this point.
- (4) Repeat this process until a QE equal to that determined at the near limit of the DSA is achieved. This location is the far limit of the DSA.

(5) Repeat these steps along other azimuths until sufficient points are determined to define the DSA.

d. Fascam Safety Zones (LFSZ and PFSZ)

FASCAM safety zones are determined by the computer any time FASCAM is planned or fired. These are sent to the coordinating agency by the agency computing the data, then are further disseminated to all units. These safety zones are deleted at the direction of the coordinating FSCC after the self-destruct time has passed.

e. Phase Lines

The BCT/LCU does not provide for the input or use of phase lines as aids to movement control. Phase lines are entered in the CFL format with the phase line named PL vice CL in accordance with appendix A.

7005. Limitations of the BCS

Dissemination of boundaries and FSCMs to the battery FDC is limited by the geometry that a BCS can store; i.e., 1 ZONE, 1 FLOT, and 8 circular RFAs. All other SPRT;BGEOM messages can be received, but those types of measures are not recognized by the BCS. The SPRT;BGEOM [1] is left blank. This causes the battery FDC to rely on the name of the geometry to determine what it is. The following specific actions are taken by the BCS.

a. ZONEs are plotted on the situation map. The ZONE of the supported infantry regiment is stored.

b. FLOTs are plotted on the situation map. The FLOT of the supported infantry regiment is stored.

c. RFAs are plotted and stored if circular.

d. DSAs cannot be reported by the battery FDC since an entry of DSA in SPRT;BGEOM [1] is recognized as an erroneous entry at the BCS. DSAs may be reported for entry at the battalion FDC using SYS;PTM. The DSA may be identified as a series of grids, or a center grid and radius.

e. All other SPRT data received is printed and plotted on the situation map.

7006. Map Modification

- a.** The BCT, LCU, and BCS use map modification data to perform zone-to-zone transformations; to allow fixed format devices to transmit short coordinates; and, in limited cases, to perform datum conversions.

- b.** All stations will maintain the same map modification data to ensure that coordinates are handled in the same manner at all levels. The GCE FSCC will enter and manually transmit the map modification data and any changes to it to subordinate stations. Each lower echelon will transmit the map modification data to its subordinates.

Chapter 8

Operations of the Forward Echelon

8001. General

As with all automated operations, the operations of a forward echelon and assumption of control from the main echelon requires adherence to detailed procedures. Principal concerns include —

- Easy transition without loss of communications to subscribers.
- Transfer of all required files to update the forward echelon.
- Avoidance of two stations using the same address and logical name.
- Transfer of existing fire missions from the main echelon to the forward echelon.

8002. Methods

Two methods of operating forward echelons are available, each with its own advantages and disadvantages.

a. Changing the Name of the Forward Echelon

Changing the name of the forward echelon to that of the main echelon upon assumption of control is the preferred method. Using this method, the forward echelon occupies the new position and conducts communications checks using the address and logical name of the forward echelon. After updating files at the forward echelon, the forward and main echelons switch identities by altering communications data. All subscribers continue to communicate with the main echelon FDC.

(1) Advantages. This technique's principal advantage is in maintaining the flow of information. Subscribers of the main echelon need not be aware of the change of control. Additionally, the vital flow of information via MOI processing is not disrupted since the forward echelon assumes the identity of the main echelon.

(2) Disadvantages. In version 10 of MCFSS software, the BCT/LCU does not check for matching SIDs. If this is changed in future software, the SID codes may require changes to avoid illegal acknowledgement authenticator warnings.

b. Operating Under the Forward Echelon Name

An alternate method is to maintain the logical name and address of the forward echelon after it has assumed control. In this method, all subscribers are notified that the forward echelon is in control and all transactions are conducted with that station.

(1) Advantages. This method provides easier communications.

(2) Disadvantages. This method requires that each subscriber knows that the change of control has occurred and submits his messages accordingly. Assumption of control of fire missions at the forward echelon is more difficult. MOI files at subscribing stations must be reentered to direct information from the main to the forward station.

8003. Changing Names upon Assumption of Control

This paragraph divides this technique into two procedures. The difference between the procedures deals with FDCs' need to transfer active fire missions to their forward echelon FDCs for processing.

a. Procedures for Stations Other than FDCs

Figure 8-1 details the steps necessary for the MEF FFCC, FSOCs, and the DASC.

| STEP | AGENCY | REMARKS |
|------|-----------------|---|
| 1 | Forward Echelon | Forward echelon displaces and occupies the next position. |
| 2 | Forward Echelon | Transmits comm checks to all stations (goal to determine if station has comm). ACK or NAK is sufficient. Do not attempt to resynchronize with any station except main echelon. |
| 3 | Forward Echelon | When comm is established and synchronization is achieved with main echelon, forward echelon transmits the following to main echelon: AFU;COMD with XMIT ALL DATA ALL FIRE UNITS TO:ME SPRT;COMD with XMIT ALL TYPES ALL NAMES TO:ME SYS;PTM:REQUEST NAMES OF CURRENT FIRE PLANS |
| 4 | Main Echelon | Main echelon enters received AFU;COMD or SPRT;COMD . Names of all current fire plans are transmitted to forward echelon. |
| 5 | Forward Echelon | Forward echelon builds modification and associated files for fire plans. When files are ready, forward echelon transmits for each fire plan — NNFP;COMD with XMIT PLAN TISF TO:ME |
| 6 | Forward Echelon | When comm is established with all required stations and all files are updated, transmits SYS;PTM indicating forward is ready to take control. |
| 7 | Main Echelon | Transmits SYS;PTM indicating forward echelon has control, and — <ul style="list-style-type: none"> • Deletes forward echelon from subscriber file. • Changes OWN NAME to that of forward echelon. • Enters main echelon as subscriber. |
| 8 | Forward Echelon | Receives SYS;PTM indicating MAIN has relinquished control, and — <ul style="list-style-type: none"> • Deletes main echelon from subscriber file. • Changes OWN NAME to that of main echelon. • Enters forward echelon as subscriber. |
| 9 | All Subscribers | Without notice to other subscribers, forward assumed control leaving them out of synchronization. Otherwise, normal operations continue. |

Figure 8-1. Procedure to Change Names for Stations Other than FDCs

b. Procedures for FDCs

(1) Ensure that **FM;CFF**, **FM;SUBS**, and **FM;QF** are entered in the **COMM**, **PCLD** menu as **DISPLAY:YES** at both the main and forward echelon FDCs.

(2) The forward echelon FDC enters an abbreviated target block with the first number significantly in advance of the last number used. The purpose of this procedure is to avoid rejection of a fire mission transmitted from the main echelon FDC because of the use of a target number from the computer's target block.

(3) Steps for transfer of control are shown in figure 8-2.

| STEP | AGENCY | REMARKS |
|------|---------------------|---|
| 1 | FO | Transmits fire mission to main echelon FDC. |
| 2 | Main Echelon FDC | Main echelon FDC processes mission. |
| 3 | Forward Echelon FDC | Forward echelon FDC displaces and occupies next position. |
| 4 | Forward Echelon FDC | Transmits comm checks to all stations (goal to determine if station has comm). ACK or NAK is sufficient. Do not attempt to resynchronize with any station except main echelon FDC. |
| 5 | Forward Echelon FDC | When comm is established and synchronization is achieved with main echelon FDC, forward echelon FDC transmits the following to main echelon FDC: AFU;COMD with XMIT ALL DATA ALL FIRE UNITS TO:ME SPRT;COMD with XMIT ALL TYPES ALL NAMES TO:ME SYS;PTM:REQUEST NAMES OF CURRENT FIRE PLANS |
| 6 | Main Echelon FDC | Main echelon FDC enters received AFU;COMD or SPRT;COMD . Names of all current fire plans are transmitted to forward echelon FDC. |

Figure 8-2. Procedure to Change Names for FDCs

| STEP | AGENCY | REMARKS |
|------|---------------------|--|
| 7 | Forward Echelon FDC | Forward echelon FDC builds modification and associated files for fire plans. When files are ready, it transmits for each fire plan — NNFP;CMD with XMIT PLAN TISF TO:ME |
| 8 | Main Echelon FDC | <p>a. Order fire units in FUSEL under forward echelon FDC's name.</p> <p>b. Recalculate all missions. Select —</p> <ol style="list-style-type: none"> 1. FIRE MISSION 2. CFF 3. RECALC 4. Select TGT NUMBER 5. Select ALTER 6. Select ACTION, ENTER <p>c. Fire mission is recalculated for FM;CENTER file processing and transmission to forward echelon FDC. Modify FM;CFF so that the same units are assigned to fire the same FFE munitions as originally determined. Transmit fire mission to forward echelon FDC.</p> |
| 9 | Forward Echelon FDC | When comm is established with all stations and all files are updated, transmits SYS;PTM indicating forward is ready to take control. |
| 10 | Main Echelon FDC | Transmits any FM;SUBS to forward echelon FDC updating its fire mission file. <ul style="list-style-type: none"> • Receive FM;SUBS. • Display FM;SUBS. • Transmit displayed FM;SUBS to forward echelon FDC. |
| 11 | Main Echelon FDC | Transmits SYS;PTM indicating forward echelon has control and — <ul style="list-style-type: none"> • Deletes forward echelon FDC from subscriber file. • Changes OWN NAME to that of forward echelon FDC. • Enters main echelon FDC as subscriber. |
| 12 | Forward Echelon FDC | Receives SYS;PTM indicating main echelon FDC has relinquished control, and — <ul style="list-style-type: none"> • Deletes main echelon FDC from subscriber file. • Changes OWN NAME to that of main echelon FDC. • Enters forward echelon FDC as subscriber. |
| 13 | All Subscribers | Without notice to other subscribers, forward assumed control leaving them out of synchronization. Otherwise, normal operations continue. |

Figure 8-2 (continued). Procedure to Change Names for FDCs

8004. Continuous Use of the Forward Echelon's Logical Name

Figure 8-3 provides a description of forward echelon operations conducted while maintaining the forward echelon's logical name.

| STEP | STATION | REMARKS |
|------|-----------------|---|
| 1 | Forward Echelon | Forward echelon displaces. |
| 2 | Forward Echelon | Forward echelon emplaces and transmits SYS;PTM:CC (comm check) to all subscribers. Forward echelon troubleshoots until all stations are up by direct communications or relay. |
| 3 | Main Echelon | Upon receiving comm check from forward echelon, main echelon transmits all updates to forward echelon. |
| 4 | Main Echelon | After communications are established with forward echelon, main echelon directs any station transmitting call for fire to retransmit this to forward echelon. Goal is to complete any existing fire missions and not accept new missions at main echelon. |
| 5 | Forward Echelon | When all updates are received and all communications are up, forward echelon transmits SYS;PTM:READY TO TAKE CONTROL . |
| 6 | Main Echelon | Main echelon transmits SYS;PTM:___ [forward echelon's logical name] IS IN CONTROL and turns off radios. Main echelon completes any fire missions and may stay on net to communicate with forward echelon. |
| 7 | Forward Echelon | Forward echelon transmits SYS;PTM:___ [forward echelon's logical name] IS IN CONTROL as received from main echelon to all stations. |
| 8 | All Subscribers | Deletes all MOI for main echelon and reenters same MOI for forward echelon. During this step, all subscribers must be careful to manually transmit these messages to forward echelon until MOI setup is again complete. |

Figure 8-3. Conducting Operations While Maintaining Forward Echelon's Logical Name

8005. Operation of the Alternate Regimental FDC

A battalion FDC, preferably the FDC of a battalion in GS, is assigned by the regimental FDC as alternate regimental FDC. This station assumes control of the regiment if the regimental main echelon FDC and forward echelon FDC are unable to operate due to casualties or hasty displacement.

a. AFU Files

The regimental FDC transmits all **AFU;UPDATES** and **AMMOs** for the regiment to the alternate regimental FDC. These are stored, and all batteries are assigned as **FM;CENTER** files under their battalion names. Those batteries not organic to the alternate regimental FDC's battalion are entered as exclusions in the **FM;XCLUDE** message.

b. Support Files

The alternate regimental FDC maintains the same support files as the regimental FDC. The regimental FDC transmits all support data to the alternate FDC.

c. Communications Nets

The alternate regimental FDC enters the Div FSC Net and all subscriber and legal message data.

d. TPC Function

The alternate regimental FDC places itself in **ATI MODE 3** and establishes level 3 **SRIs** with the regimental TPC for all **ARTY, MORTAR, and RKTMSL** type targets. Every two hours the alternate regimental FDC conducts a level 3 search for all **SUPPLY/AMMO, EQUIP/RADAR, and PERS/OP** targets. The following **ATI MOD FILE** entries are made:

(1) **ATI;FMMOD**. These entries are prepared to ensure that no fire missions are generated from the **ATI MODE 3** processing:

- **WTYP:99**
- **WSIZE:99**
- **WDOP:99**
- **RV:01**

(2) **ATI;SVMOD**. These entries are prepared to ensure that no combinations are generated from the **ATI MODE 3** processing:

- **TIMEX:01/00/00**
- **TIMEY:0090**
- **QMOD:40**
- **RV:375**
- **DNARV:50**
- **QMOD:40**
- **RPF:001**

e. Assumption of Control

If the alternate regimental FDC is unable to communicate with the regimental FDC directly *and* all other battalion FDCs have lost communications for 10 minutes, the alternate regimental FDC assumes control of the regiment using the steps shown in figure 8-4.

| STEP | STATION | MESSAGE | REMARKS |
|------|--------------------------|------------------------|---|
| 1 | Alternate Regimental FDC | | Decision is made to take control. |
| 2 | Alternate Regimental FDC | SYS;PTM | Transmits to all stations SYS;PTM:____ [alternate FDC's logical name] IS IN CONTROL. |
| 3 | Alternate Regimental FDC | Voice | Informs division FSCC of assumption of control and requests comm check on Div FSC Net. |
| 4 | Alternate Regimental FDC | FM;XCLUDE | Deletes exclusion of all fire units of regiment. |
| 5 | Alternate Regimental FDC | FM;MOD | Changes ZONE to the division zone and reinforcing unit to BLANK. |
| 6 | Alternate Regimental FDC | ATI;FMMOD ATI;SVMOD | Changes existing data to reflect TPC entries in MCFSS enclosure of operation order and requests any changes from division FSCC. |
| 7 | All Subscribers | | Change all MOIs for regimental FDC to route same messages to battalion assuming control. |

Figure 8-4. Procedure for the Alternate Regimental FDC to Assume Control

8006. Operation of the Alternate Battalion FDC

The battery BCS has a very limited capability to perform as a battalion FDC. If the battalion FDC is expected to be out of action for a long period of time, another BCT-equipped battalion *should* be assigned control of the battalion's batteries. Nevertheless, a battery FDC is selected and assigned as the alternate battalion FDC.

a. Communications

The alternate battalion FDC communicates with the infantry regimental FSCC and the artillery regimental FDC by voice on the designated voice nets. The alternate battalion FDC communicates with the other batteries of the battalion by initiating *one* of the two following options.

(1) It directs batteries to communicate digitally with the alternate battalion FDC on the Bn FD Net.

(2) It directs the condensing of COF nets so that all batteries, FOs, and FSCCs operate on not more than two nets.

b. Fire Mission Mode

The artillery battalion and infantry regiment must operate in the FSCC Approval Mode to free the limited assets of the alternate battalion FDC from becoming involved in coordinating fires.

c. Assumption of Control

If the alternate battalion FDC is unable to communicate with the battalion FDC directly and all other battery FDCs and battalion FSCCs have lost communications with the battalion FDC for 10 minutes, the alternate battalion FDC assumes control of the battalion using the steps shown in figure 8-5.

| STEP | STATION | MESSAGE | REMARKS |
|------|-------------------------|---------------------|---|
| 1 | Alternate Battalion FDC | | Decision is made to take control. |
| 2 | Alternate Battalion FDC | SYS;PTM | Transmits to all stations SYS;PTM:____ [alternate FDC's logical name] IS IN CONTROL. |
| 3 | Alternate Battalion FDC | Voice | Informs infantry regimental FSCC and artillery regimental FDC of assumption of control, and requests voice comm checks on Regt FSC Net and Regt FD Net or appropriate voice nets. |
| 4 | Other Battery FDCs | SYS;INIT | Enters the alternate battalion FDC logical name in FSOXMIT field. |
| 5 | Other Battery FDCs | SYS;COMM SYS;SBT | Makes necessary software changes to reconfigure nets and enters device type V for the alternate battalion FDC. |
| 6 | Battalion FSCCs | SYS;PTM | Directs observers to switch to FSCC Approval Mode. |

Figure 8-5. Procedure for the Alternate Battalion FDC to Assume Control

d. Tactical Fire Direction

The alternate battalion FDC continues to answer calls for fire from battalion FSCCs and FOs. It also monitors all calls for fire received by other battery FDCs via MOI, following the steps shown in figure 8-6 to conduct tactical fire direction.

| STEP | STATION | MESSAGE | REMARKS |
|------|-------------------------|---------|---|
| 1 | Battery FDC | FM;CFF | Receives FM;CFF from battalion FSCC after it clears mission. Executes FM;CFF. BCS automatically transmits MOI FM;CFF to FSOXMIT address. |
| 2 | Alternate Battalion FDC | FM;CFF | MOI FM;CFF with SB field indicating transmitting battery is received. Examines TYPE, SIZE, and location. If decision to mass on target is made, go to step 3. Decision not to mass is indicated by silence. |
| 3 | Alternate Battalion FDC | SYS;PTM | Transmits fire order to battery that sent FM;CFF: — UNIT TO FFE UNIT TO ADJ SPEC INSTR NUMBER OF RDS SH/FZ I/E TGT NUMBER Fire order standards (unless changed by controlling FDO) are — Unit to fire: Battalion Unit to adjust: Must be receiving battery Special instructions: When ready Number of rounds: 1 Shell/fuze: HEF/TIB Target number: No standard |
| 4 | Initiating Battery FDC | SYS;PTM | Receives fire order, entering — FM;CFF:M; SH:___ [per fire order] FZ:___ [per fire order] CONT:___ [per fire order] UFFES:___ [units to FFE or ALL per fire order] |

Figure 8-6. Procedure for the Alternate Battalion FDC to Conduct Tactical Fire Direction

| STEP | STATION | MESSAGE | REMARKS |
|------|------------------------|-----------------------------|---|
| 5 | Initiating Battery FDC | FM;CFFOs, BCS Fire Commands | Fire mission chain displays FM;CFF followed by FM;CFFOs for each battery and fire commands for guns. Reviews and transmits each FM;CFFO, then BCS fire commands. (If mission is adjust fire mission, original FM;CFFOs display MF:DNL. FM;CFFOs are generated again for FFE with MF:WR or AMC.) |
| 6 | Initiating Battery FDC | FM;FOCMD | All FM;FOCMDs are routed to initiating FDC. Transmits first SHOT and last RDCOMP. |
| 7 | Initiating Battery FDC | FM;EOM | When EOM is received, FM;EOM messages are generated to all units that fired. |
| 8 | Initiating Battery FDC | Voice | Submits target number, TYPE, and surveillance to battalion FSCC. |
| 9 | Battalion FSCC | AFU;MFR | Completes and transmits AFU;MFR to regimental FSCC. |

Figure 8-6 (continued). Procedure for Alternate Battalion FDC to Conduct Tactical Fire Direction

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Chapter 9

Continuity of Operations

9001. Overview

Automated operations is the primary method for the operations of all stations in MCFSS. It is expected, however, that computer and communications equipment will fail from time to time. The ongoing nature of fire support operations requires that sufficient redundancy be built into the system to preclude an interruption in fire support.

9002. Communications

Data communications are susceptible to failure from loss of signal, failure of communications equipment, and computer loss or damage. The following rules should be used to cope with communications degradation.

a. Troubleshoot Immediately

- (1) Troubleshoot equipment at your station. Examine all radio and remote control unit settings. Check cables and antennae. Ensure cryptographic equipment fills are still intact.
- (2) Examine computer net data for appropriate settings. Change these settings only at the direction of the NCS.
- (3) Ensure correct subscriber data is entered and the status of the subscriber is **ON**. An incorrect device type associated with a subscriber changes some message routing and formatting.

b. Examine Alternate Communications Paths

- (1) When troubleshooting fails, relay communications can solve communications problems with a single station. This is a potential solution when an intermediate station can communicate with a non-communicating subscriber. The NCS approves relays and assigns relay addresses as required. The relaying station directs the implementation of the relay.

(2) If voice, but not digital, communications are possible, consider placing the voice station(s) on a single net. This may require the transfer of other computer stations from an existing data net to another data net to create the voice-only net. Avoid mixing voice and data communications on the same net.

9003. Levels of System Degradation

a. Computer Operations with Partial Voice Communications

Establish voice communications with all subscribers. Reconfigure the nets to provide voice and data nets as required. Collapse nets to free equipment and make space for changes. All stations continue to process data using the computers entering data from the keyboards.

b. Computer Operations with Total Voice Operations

Convert all nets to voice operations. Use computers at all stations to process data manually entered by the operator.

c. Conversion to Manual and Voice Operations

The failure of numerous stations may require conversion to traditional operations. Refer to the FMFM 6-9, *Marine Artillery Support*, FMFM 6-18, *Techniques and Procedures for Fire Support Coordination*, or appropriate U.S. Army field manuals (FMs) for these procedures.

9004. Redundancy

Loss of computer operations results in the loss of all computer stored data which can be catastrophic. The following procedures minimize the loss of data caused by computer failure.

a. Record data bases after the input of new data and at the intervals prescribed by unit SOP.

b. Print data base files and keep the printouts up-to-date. File these separately from the journal. At a minimum, the following files are printed based on the device.

(1) At the BCS, print the following data base files:

- **SYS;COMM**
- **SYS;SBT**
- **AFU;UPDATE**
- **AFU;AMMO**
- **AFU;REG**
- **all SPRT;BGEOMs**
- **all SPRT;ZONES**
- **all targets and known points**
- **all met messages**

(2) At the IFSAS LCU or BCT, print data base files based on the plan.

(a) For the current plan, print the following data base files:

- **SYS;1201**
- **AFU;2203**
- **SPRT;7201**
- **FM;5204**
- **all observers**
- **all targets and known points**
- **ATI;8213**

(b) For each fire plan, print the following data base files:

- **AFU;2203**
- **SPRT;7202**
- **NNFP;4221**
- **all target lists**

(reverse blank)

Appendix A

Naming of Geometry

1. Support files are used by all stations in MCFSS. Because of their universal nature, a naming convention must be established to ensure understanding and lack of duplication.
2. Geometry names use not more than six characters. These six characters are split to provide the following three pieces of information:
 - a. The first two characters designate the type of geometry:
 - AC** = Airspace coordination area (**ACA**)
 - CH** = Chemical hazard area
 - CL** = Coordinated fire line (**CFL**)
 - DA** = Damage assessment area
 - DS** = Dead space are (**DSA**)
 - FF** = Free fire area
 - FL** = Forward line of troops (**FLOT**)
 - FS** = Fire support coordination line (**FSCL**)
 - NF** = No fire area
 - OB** = Objective area
 - RF** = Restricted fire area (**RFA**)
 - RL** = Restricted fire line (**RFL**)
 - TV** = Target value area (**TVA**)
 - ZO** = Zone
 - b. The third character is a numerical sequencing of the geometry input. For example, the first **RFA** established by an agency is number 1. Number 1 may be updated or completely deleted and replaced with number 2.
 - c. The fourth, fifth, and sixth characters are the tag name of the unit that established the geometry (see appendix B).

d. Examples:

ZO12MD = The first **ZONE** established by 2d Marine Division.

FL27MR = The second **FLOT** established by 7th Marines.

DS4E11 = The fourth **DSA** established by Battery E, 11th Marines.

RF21A8 = The second **RFA** established by 1st Battalion, 8th Marines.

Appendix B

Unit Tag Names

1. Tag names are three-character abbreviations used to identify units in message data fields with limited space. Tag names are used in the **FSCoord** fields of support messages as well as in the naming of fire plans and geometry.

2. The following rules apply:

a. Regimental and larger size units are identified by the numerical designation followed by two characters identifying the unit size. The following unit size designators are used:

MF = MEF
FF = MEF forward
U = MEU
MD = Marine division
MR = Marine regiment

b. Regiments with two digit designation (i.e. 23d Marines) use the number followed by **M**. For example, 23d Marines is **23M**.

c. Battalions use their abbreviated battalion name (e.g., 1/5) with the letter **A** replacing the virgil (/). For example, 1st Battalion, 5th Marines is **1A5**.

d. Battalions of regiments numbered higher than 9 use the entire abbreviated battalion name (e.g., 1/25) omitting the virgil (/). For example, 1st Battalion, 24th Marines is **124**.

e. Separate battalions use the battalion number followed by two letters from the following list identifying the battalion. For example, 1st Tank Battalion is **1TK**.

AA = assault amphibian battalion
CE = combat engineer battalion
LA = light armored reconnaissance battalion
TK = tank battalion

f. Artillery firing batteries use the battery letter followed by the regiment number. For example, Battery D, 10th Marines is **D10**.

g. Forward observers use the letters **FO** followed by the letter of the supported infantry company. For example, the FO for Company C, 1st Battalion, 6th Marines is **FOC**.

h. The TPC uses the letter **T** followed by the artillery regiment's number. For example, 11th Marines' TPC is **T11**.

Appendix C

Naming Fire Plans

1. Fire plans are named using six characters and the following convention.

2. The first two letters indicate the type of plan:

CA = countermechanized (armor) program

CF = counterfire program

CP = counterpreparation

FA = FASCAM

GP = group

MO = countermobility program

OC = on-call plan

PP = preparation fire

QK = quick fire plan

SA = suppression of enemy air defense plan

SE = series

TB = target bulletin

3. The third character is a numerical sequencing of the fire plans as they are entered. For example, the first preparation fire established by an agency is **PP1**.

4. The fourth, fifth, and sixth characters are the tag name of the unit that established the geometry (see appendix B).

5. Examples:

SE21A6 = The second series established by 1st Battalion, 6th Marines.

CF1T10 = The first counterfire program established by 10th Marines
TPC.

PP12MD = The first preparation fire established by 2d Marine Division.

(reverse blank)

Appendix D

ATI Function

1. General

The ATI program is designed to perform fire plan and counterfire targeting. This appendix is intended as a supporting document to provide the supervisor a basic knowledge of the workings of the ATI function.

2. ATI Reports

A number of reports may be submitted by various target acquisition agencies. Most of these are stored with a target number in the ATI file at the mode 3 computer. To call these targets is premature since they may not represent targetable information.

a. Reports Constituting a Target

The following received reports are stored as targets in the mode 3 computer:

- (1) **ATI;CDR.** This is a report of a target using grid locations which may be generated at a BCT, LCU, BCS, DCT, Q-36, or JSTARS.
- (2) **ATI;AZR.** This is a report of a target using polar location which may be generated at a BCT, LCU, BCS, or DCT.
- (3) **ATI;SHR.** This is a report of the results of a crater analysis which may be generated at a BCT, LCU, BCS, or DCT.
- (4) **ATI;MFR.** This is a report of the attack of a target which may be generated at a BCT or LCU.
- (5) **AFU;MFR.** This is a report of the attack of a target which may be generated at a BCT or LCU.
- (6) **ATI;TGR.** This is a report format used by the BCT/LCU computer to store targets.

b. Other Reports

Two other **ATI** reports may be received, but are not stored as targets and do not update existing targets:

- (1) **ATI;CBTI**. This is a free text report of activity at an existing target.
- (2) **ATI;SVL**. This is a free text report of enemy activity but does not use a target number.

c. Processing

The following processing occurs for incoming reports:

- (1) If no **DTG** is entered, the report is assigned the current system **DTG**.
- (2) If no target number is entered, the target is assigned the next target number from the computer's target block.
- (3) The **DTG** of the report is compared with the **MAX REPORT AGE (TIMEX)** entered in the **ATI;SVMOD** message. If the report is older than the age limit, it is output to the alert queue without updating the target file.
- (4) If the report is a target update and there are no blocks to processing, the target is updated. If updated target is a solution or a constituent, the operator is warned, and a constituent report is output.
- (5) If delete is specified with additional data, that data is deleted from the target on file.
- (6) If delete is specified with no additional data and there are no blocks to processing, the target is deleted. If the deleted target is a solution, all constituents are deleted. (If a solution is to be deleted without deleting the constituents, use **ATI;SPLIT** message.) If all constituents are deleted without deleting the solution report, the solution is renamed as a constituent without an agency.
- (7) All locations are converted to grids and checked against the map modification.

3. ATI MOD FILE

The **ATI MOD FILE** is composed of five messages.

a. ATI;SVMOD

ATI;SVMOD format is used to specify criteria to control the number of automatic target combinations. Each incoming target must meet these criteria before being considered for combination with another target. Criteria include proximity, target similarity, and differences in report time.

(1) MAXIMUM REPORT AGE (TIMEX) specifies the maximum acceptable time difference between the present time on the BCT and the time of sighting of each target report. The software will not accept a value less than 1 day. **MONTH** is the number of days in the last month.

(2) MAXIMUM ACCEPTABLE TIME DIFFERENCE (TIMEY) specifies the maximum difference in time between two reports considered for combination.

(3) MAXIMUM REPORT VALUE (RV) specifies the largest report value (radial error in accuracy of location measured in meters) acceptable to allow a report to be considered for combination. This value is also automatically entered in **ATI** target reports that are received with an **RV** but not an **AGENCY** entry.

(4) DO NOT ADJUST REPORT VALUE (DNARV) is the largest radial error in meters acceptable to consider the target location reported sufficiently accurate to not adjust the grid based on related reports when combination occurs.

(5) MAXIMUM DEGREE OF PROTECTION DIFFERENCE (DOPMOD) is the maximum degree of protection difference that two personnel targets may possess and still be combined. Since personnel targets can change their degree of protection rapidly, a larger value should be used. This value affects the resolution factor computed for a pair of targets.

(6) COMPARISON LIMIT (QMOD) specifies target comparison limits. This factor is explained in detail in paragraph 6.

(7) **RELATIVE PROXIMITY FACTOR (RPF)** specifies combination limitations based on distance between targets. It is not a distance, but a variable factor used in an equation. The higher the factor, the farther targets can be apart and still combine.

b. ATI;FMMOD

ATI;FMMOD format is used to establish criteria for the automatic generation of fire missions. The BCT uses four fire mission criteria to selectively generate fire missions on incoming **ATI** reports. The target must meet or exceed all four criteria to generate a mission. These criteria are report value (**RV**), weighted type (**WTYP**), weighted degree of protection (**WDOP**), and weighted size (**WSIZE**). **RV** is determined by the computer using a series of look-up tables which reflects the ability of each of 20 different target acquisition agencies to determine the location of 17 different target types (**RV** is modified using the **ATI;STAT** format, see paragraph 3c). **WTYP**, **WDOP**, and **WSIZE** are a series of combining weights for each target in terms of the acquiring agency's ability to accurately describe the target type, degree of protection, and size. Values range from 0 to 99. The higher the value entered, the more restrictive the measure; e.g., if 99 is entered, no targets can qualify.

c. ATI;STAT

The **ATI;STAT** format is used to modify the report accuracy, range error, and location error of up to 18 target location agencies for each of 17 target types.

d. ATI;TBMOD

The **ATI;TBMOD** is used to establish criteria for determining the number of targets needed in an area to constitute a target buildup. Target buildup criteria can range from 0 to 99. The incoming target counts as 1. For example, with a target buildup criteria of 5, the computer must find four other targets within 0.5, 1, or 1.5 kilometers of the incoming target to generate an **ATI;8208** target buildup report. The computer searches these radii until the required number of targets is found and then stops the search; i.e., if a buildup exists within 0.5 kilometer, the search is not extended beyond that radius.

e. ATI;DPMOD

The **ATI;DPMOD** message is used to regulate the number of **ATI** output reports (8202, 8203, 8204, 8205, and 8207). These reports can be too much to handle during surge operations and are considered to be high-volume reports.

4. Numerical Values

Decisions made during target processing to resolve duplications or to fire a received target must be reduced to criteria the computer can use in duplicating these decisions. These criteria are entered in the form of numerical factors which must be monitored and updated by supervisors at the mode 3 stations.

a. REPORT VALUE (RV)

RV is the radial error that is expected of the average operator or member of the reporting agency. MCFSS recognizes 20 target acquisition agencies and 17 target types. MCFSS assigns a default error based on the assumed average ability of the agency to locate each target type. It is assumed that the report value, as a radius, defines the area in which the target may actually lie.

b. RANGE ERROR

RANGE ERROR is an assumed accuracy in estimating distances by the four human agencies (**FO**, **FOWOL**, **OBSR**, and **LRRP**).

c. AZIMUTH ERROR

AZIMUTH ERROR is an assumed error in determining direction by the four human agencies.

d. LOCATION ERROR

LOCATION ERROR is a radial error in meters assumed to be the accuracy with which the human agencies can determine their own location.

e. Altering Default Values

These assigned accuracies can be altered for any agency (but not individuals of the agency) using the **ATI;STAT** message.

5. Factors Governing Fire Mission Output

As mentioned in paragraph 3b, the **ATI;FMMOD** message governs fire mission output.

a. Reports Considered

Reports considered may be limited to the following:

- (1) **COORDINATE REPORTS** causes all targets located by grids to be examined as potential fire missions.
- (2) **SOLUTION REPORTS** causes only the results of combinations to be examined as possible fire missions.
- (3) **ALL TARGET REPORTS** causes every incoming target to be examined.

b. MAX REPORT VALUE

MAX REPORT VALUE is the smallest error in accuracy of the target location not acceptable for consideration for processing as a fire mission.

c. MINIMUM COMBINING WEIGHT

The ability of each target acquisition agency to accurately locate and identify targets varies from agency and target type. MCFSS uses a system of weighted values to define the agency's ability. The numbers assigned are a result of a research effort that began with the inception of the Army's TACFIRE system. A combining weight is available for each agency with respect to target type/subtype, size, strength, and degree of protection (applicable to personnel-type targets only). The specific value means nothing by itself. However, the higher the value, the more accurate and more reliable the target description and identification. The numbers are really intended to be used as comparisons of relative worth. An agency reporting a target that yields a combining weight of 49 is more reliable than an agency that yields a combining weight of 10. The combining weights are published in the combining weight tables in appendix F.

d. Determination of ATI;FMMOD Criteria

Figure D-1 can be used to translate targeting and commander's criteria in values for the ATI;FMMOD message. Entries made in the ATI;FMMOD should be derived from the commander's HPT list and/or priority target list.

| STEP | REFERENCE | ACTION |
|------|---|---|
| 1 | High Payoff Target List or Priority Target List | Determine HPTs or priority targets as issued by commander. |
| 2 | Target Type/Subtype List | Convert HPTs and priority targets to their TACFIRE equivalents. |
| 3 | Target Acquisition Agency List | Determine TACFIRE equivalent for the target acquisition agency that will locate each target type. |
| 4 | Combining Weight Table | Enter combining weight table with each target acquisition agency and each target type. Extract combining weight values for type, size, and DOP. |
| 5 | | Select the lowest factor for type, size, and DOP from those extracted. |
| 6 | | Subtract 1 from each of the factors in step 5 to determine the values for entry into the computer. |
| 7 | ATI;FMMOD | Enter the values from step 6 for WTYPE, WDOP, and WSIZE. |
| 8 | ATI;COMD | Print the accuracy table. |
| 9 | ATI;8214 | Determine the accuracy (RV) in meters of each agency from step 3 locating each target type from step 2. |
| 10 | | Select the largest RV from step 9. |
| 11 | | Add 1 to the value from step 10. |
| 12 | ATI;FMMOD | Enter the value from step 11 as RV: __ in the ATI;FMMOD. |

Figure D-1. Procedure for Translating Targeting and Commander's Criteria

e. Requirements to Generate a Fire Mission

An incoming report must pass all of the following tests to output a fire mission.

- (1) The incoming report must be a type report specified in the **ATI;FMMOD** message that is selected for examination.
- (2) Based on the agency locating the target and the target type, the incoming report must be assigned a combining weight for type greater than the **WTYP** entry in the **ATI;FMMOD** message.
- (3) Based on the agency locating the target and the target size, the incoming report must be assigned a combining weight for size greater than the **WSIZE** entry in the **ATI;FMMOD** message.
- (4) If the target type is personnel, based on the agency locating the target and the reported degree of protection, the incoming target must be assigned a combining weight for **DOP** equal to or greater than the **WDOP** entry in the **ATI;FMMOD** message.
- (5) Based on the agency locating the target and the target type, the incoming report must possess a report value less than that entered as the **MAX RV** in the **ATI;FMMOD** message.

6. Factors Governing Combination of Targets

As reports of targets are received, each new target is compared to those targets in the computer's target file. A number of factors are used as tests to determine if the target should be combined with any existing targets.

a. Proximity Factor (U)

This is the ratio of the distance (d) between the reported target locations and the sum of the report accuracies of the agencies that reported the targets. The formula for proximity factor is:

$$U = \frac{d}{RV_1 + RV_2}$$

A proximity factor of 1 or less is required to cause targets to combine. The following three possible results could occur for any two compared targets.

- (1) A value of 1 indicates that the circles described by the two reporting agencies' possible error (report values) are tangent. If the reports are of the same target and the target combines, an assumption can be made that the solution target lies at the point that the two circles touch.
- (2) A value less than 1 indicates that the circle defined by the report values overlap, and the solution target possibly lies within the overlap.
- (3) A value greater than 1 indicates that the distance between the compared target locations is greater than the sum of the radii of the **RV** circles. Even based on the most inaccurate report assumed possible for each agency, the targets could not be the same.

b. Degree of Protection Difference

The degree of protection difference is a numerical value entered in the **ATI;SVMOD** message and compared to that computed for a pair of targets being considered for combination. Entries are 1 through 9 with 9 representing the least similarity in reported degrees of protection and 1 being identical degrees of protection.

c. QMOD

QMOD is a value entered in the **QMOD** field of the **ATI;SVMOD** message. This value is compared to the tactical factor (**Q**) computed by the computer for each pair of compared targets. If the value of **Q** is greater than **QMOD**, the targets will combine. The following factors are used in this comparison.

(1) **Relative Proximity Factor (RPF)**. **RPF** is a factor, vice distance, that the computer uses in the determination of the tactical factor that is computed and assigned to a target. The **RPF** may be altered by the operator by making an entry in the **RPF** field of the **ATI;SVMOD** message. Otherwise, the computer uses a default value of 300. Though other factors also affect combination, when taken alone, the following rules apply to **RPF**.

- (a) Increasing the value for **RPF** increases the number of combinations that will occur.

(b) Decreasing the value of *RPF* decreases the number of combinations that occur.

(2) **Resolution Factor (R_s).** R_s is a computer assigned value that indicates the degree of similarity between two targets being compared. A value of 4.0 indicates exact match in target type while 0.0 indicates completely dissimilar target types. This factor is generated for each compared target and cannot be changed by the operator.

(3) **Tactical Factor (Q).** Q is a numerical value assigned to the target based on its relative importance in the tactical situation. The value of Q is determined by the computer through the following formula shown. Refer to the formula. Note that the value of Q is a modified value of R_s . The quantity U plus the ratio d divided by *RPF* is subtracted. The following deductions can be made:

$$Q = R_s - \left(U + \frac{d}{RPF} \right)$$

(a) Decreasing the value of *RPF* increases the value of the ratio d divided by *RPF*. Consequently, a larger value results when the ratio is added to U . This sum is subtracted from the value of R_s yielding a smaller value of Q . Increasing the value of *RPF* has the opposite effect. Thus the larger the *RPF*, the more likely they are to combine.

(b) A larger distance between the reported target locations (d), has a similar effect as a small *RPF*, making the ratio d divided by *RPF* a larger value. It also results in a larger value of U (see proximity factor above). A larger value of d decreases the value of Q by causing a greater quantity to be subtracted. A smaller d has the opposite effect. Thus the closer targets are, the more likely they are to combine.

(c) The more similar the targets, the greater the value of R_s that is assigned. The larger the R_s , the larger the Q (the remainder after subtraction) will be. Thus, more similar targets combine more frequently.

(4) **Maximum Separation Distance (D_S)**. D_S is the greatest distance in meters between two targets that will combine. This distance is computed using the lesser value developed from two formulas:

$$D_S = \frac{(R_S - QMOD)(RPF)(RV_1 + RV_2)}{RPF + RV_1 + RV_2}$$

$$D_S = RV_1 + RV_2$$

Though maximum separation distance is not directly involved in the Q formula, the maximum separation distances for all possible combinations of factors are listed as solutions of the max distance formulas and tabulated in the Separation Distance Tables in appendix G. The Separation Distance Tables provide a tool for determining the values of RPF and $QMOD$ for entry into the $ATI;SVMOD$.

(a) The Separation Distance Tables may be divided into sections for reference. Figure D-2 shows a section of one of the tables labeled for explanation.

- **A** is a column labeled "INDEX." The index numbers represent the value of $QMOD$ in the maximum separation distance formula.
- **B** is the body of the table. These values represent separation distances based on the entry arguments on the left and top of the table.
- **C** is the value of RPF for this part of the table. The separation distance table is divided into parts based on values of RPF beginning with 50 and increasing in increments of 50. The last table given is for RPF 999.
- **D** is a heading that lists two report values. These are RV_1 and RV_2 in the max separation distance formula. If the report values are not listed, two listed values with the same sum will produce an accurate solution; e.g., 150 and 350 are not listed but 100 and 400 will yield the same answer.

| | | | | | | | | | | | | |
|-------|---------|----|----|----|----|-----|----------|-----|-----|-----|-----|----------|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | D |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | |
| INDEX | RPF 150 | | | | | | | | | | | |
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C |
| 3.5 | 8 | 17 | 21 | 23 | 27 | 30 | 31 | 35 | 37 | 38 | 42 | |
| 3.0 | 17 | 34 | 42 | 47 | 54 | 60 | 63 | 71 | 75 | 77 | 85 | |
| 2.5 | 20 | 45 | 60 | 70 | 81 | 90 | 95 | 106 | 112 | 116 | 128 | |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | A |
| | | | | | | | B | | | | | |

Figure D-2. Extract of Separation Distance Table

- R_s is represented in the table by renumbering the $QMOD$ column beginning at the value of $QMOD$ with R_s 4.0 and decreasing by 0.5 at each index number until the top of the table is reached. The numbered values of R_s represent the range of R_s in which combinations will take place. In figure D-3, E is the renumbered R_s column for a $QMOD$ of 2.0. Combinations can take place within a range of R_s from 4.0 to 2.0.

| | | | | | | | | | | | | |
|---------------------------|---------|----|----|----|----|-----|-----|-----|-----|-----|-----|--|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | |
| INDEX | RPF 150 | | | | | | | | | | | |
| 4.0 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3.5 2.5 | 8 | 17 | 21 | 23 | 27 | 30 | 31 | 35 | 37 | 38 | 42 | |
| 3.0 3.0 | 17 | 34 | 42 | 47 | 54 | 60 | 63 | 71 | 75 | 77 | 85 | |
| 2.5 3.5 | 20 | 45 | 60 | 70 | 81 | 90 | 95 | 106 | 112 | 116 | 128 | |
| 2.0 4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| 0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | |

Figure D-3. Example of Separation Distance Table with R_s Numbered

(b) Examples of the Use of the Separation Table. The separation distances in the body of the separation tables may be divided into two cases. Examination of the table in figure D-3 with report values of 10 and 10 shows increasing values of max distance from 0 to 17. The next listed value is 20, and that number is unchanging for the remainder of the table. The changing values are the result of the following maximum distance formula:

$$D_S = \frac{(R_S - QMOD)(RPF)(RV_1 + RV_2)}{RPF + RV_1 + RV_2}$$

The unchanging values result from the following formula:

$$D_S = RV_1 + RV_2$$

- **Example 1.** A target is filed in the computer from an agency with a report value of 35. A new report is received with a report value of 50 and the computer assigns a resolution factor of 3.5. The **ATI;SVMOD** message has **RPF** 150 and **QMOD** 2.0. The maximum distance (see figure D-2) can be computed as follows. (If the solution to the equation is a negative value, the two targets cannot be combined.)

$$D_S = \frac{(R_S - QMOD)(RPF)(RV_1 + RV_2)}{RPF + RV_1 + RV_2}$$

$$D_S = \frac{(3.5 - 2.0)(150)(35 + 50)}{150 + 35 + 50}$$

$$D_S = 81$$

- **Example 2.** A target is filed in the computer from an agency with a report value of 10. A new report is received with a report value of 50 and the computer assigns a resolution factor of 3.5. The **ATI;SVMOD** message has *RPF* 150 and *QMOD* 2.0. The maximum distance (see figure D-2) can be computed as follows. (If the solution to the equation is a negative value, the two targets cannot be combined.)

$$D_S = RV_1 + RV_2$$

$$D_S = 10 + 50$$

$$D_S = 60$$

d. Combination Tests of Incoming Targets

Incoming targets must pass *all* of the following tests to result in a combination. (Targets reported by JSTARS cannot be combined by the computer or the operator. Additionally, targets marked as **DO NOT COMBINE** cannot be automatically combined. Nor can two targets combine if both are marked as **DO NOT ADJUST**, since their locations cannot be adjusted to produce a solution target location.)

- (1) The time difference in the two reports' DTGs must be less than the value entered in **MAX TIME DIFFERENCE (TIMEY)** in the **ATI;SVMOD** message.
- (2) The value of the proximity factor (*U*) must be equal to or less than 1.
- (3) The value of tactical factor (*Q*) computed for the target must be greater than that entered in *QMOD* of the **ATI;SVMOD** message.

7. Determination of *QMOD* and *RPF*

Agencies that write operations orders and supervisors of **ATI MODE 3** operations must both be able to translate commander's criteria and S-2 guidance into values for the **ATI;SVMOD** message. Figure D-4 provides a method for using the Maximum Separation Distance Tables.

| STEP | REFERENCE | ACTION |
|------|-----------------------------------|--|
| 1 | | Select 2.0 for resolution factor (R_s). |
| 2 | | Arbitrarily select value for relative proximity factor (RPF). This may be changed later. |
| 3 | Maximum Separation Distance Table | Enter table with RPF selected in step 2. Renumber R_s column at left by crossing out value selected in step 1 and pencilling in 4.0. Renumber the remainder of the table toward the top, decreasing by 0.5 until reaching the top of the table or the pencilled number 0.0. This indicates that combinations will take place in the range from tactical factor (Q) of 4.0 to the last pencilled value. |
| 4 | | Examine table to determine if distance between targets for varying agencies is acceptable. Enter top of table with two agencies' RV. With varying values of R_s , cross index from the left and extract the maximum distance the two reports may be separated and still combine. |
| 5 | | If the solution determined in step 4 is satisfactory, go to step 8. If the decision is made to decrease the maximum distance, go to step 6. If the decision is made to increase the maximum distance, go to step 7. |
| 6 | | To decrease the maximum distance, select a lower value of RPF or greater value of R_s (or both) and repeat steps 3 through 5. After a satisfactory solution is determined, go to step 8. |
| 7 | | To increase the maximum distance, select a higher value of RPF or lesser value of R_s (or both) and repeat steps 3 through 5. After a satisfactory solution is determined, go to step 8. |
| 8 | | When a satisfactory solution has been determined, RPF is the last RPF value used and selected R_s is $QMOD$. |

Figure D-4. Method for Using Maximum Separation Distance Tables

8. ATI Output Reports

Figure D-5 indicates the ATI report output and required circumstances.

| REPORT NAME | OUTPUT WHEN | DPMOD ENTRY | DATA PROVIDED IN REPORT |
|--|--|---|--|
| ATI;8201 COMBINATION REPORT | Incoming report is automatically combined with existing report. | None | Incoming report, existing report, and solution are printed in level 3 output. Statistical test results are provided for proximity, resolution, and tactical factors. |
| ATI;8202 RECOMMENDED FOR COMBINATION REPORT | Incoming report and existing report pass statistical tests for combination but were not combined because another set had better overall agreement. | PRINT RECOMMENDED FOR COMBINATION REPORT:YES | Incoming report and recommended-for-combination-with reports are printed in level 3 output. Statistical test results are provided for proximity, resolution, and tactical factors. |
| ATI;8203 RECOMMENDED FOR INSPECTION REPORT | Incoming report and existing report pass statistical tests for combination but were not combined because one target had DNC:X ; marked or both had DNA:X ; marked. | PRINT RECOMMENDED FOR INSPECTION REPORT:YES | Incoming report and recommended-for-inspection reports are printed in level 3 output. Statistical test results are provided for proximity, resolution, and tactical factors. |
| ATI;8204 INCOMPATIBILITIES REPORT | Incoming report and existing report(s) within 1 kilometer of incoming location fail statistical tests for combination. | PRINT INCOMPATIBILITIES REPORT:YES | Incoming report and incompatible-with reports are printed in level 3 output. Statistical test results are provided for proximity, resolution, and tactical factors. |

Figure D-5. ATI Report Processing

| REPORT NAME | OUTPUT WHEN | DPMOD ENTRY | DATA PROVIDED IN REPORT |
|--|---|--|---|
| ATI;8205 IN FAN REPORT | Incoming report location plots within ± 50 mils of azimuth reported in ATI;SHR and incoming target type matches ATI;SHR weapon and caliber. | PRINT IN FAN REPORT: YES | Incoming report correlates with ATI;SHR data printed in ATI;TGR format. |
| ATI;8206 INTERSECTING RAYS REPORT | Incoming ATI;SHR azimuth and azimuth of existing report intersect to predict possible weapon location. | PRINT INTERSECTING RAYS REPORT: YES | Incoming report and intersects report printed in level 3 format with grid of intersection. |
| ATI;8207 CONSTITUENTS REPORT | Generated when targets are combined at operator direction or are automatically combined. | PRINT CONSTITUENTS REPORT: YES | Existing solution and constituents in level 3 format. |
| ATI;8208 TARGET BUILDUP REPORT | Generated when incoming report and existing targets within 1.5 kilometers equal or exceed number of targets to constitute buildup as established in TBMOD message. | None required | Number of targets found and grid and radius of each target from incoming report. |
| ATI;8209 QUERY REPORT | Generated in response to an ATI;QUERY message. | None required | Number of targets satisfying level 1 request, one line report of each target for level 2 request, and complete output report for level 3 request. |

Figure D-5 (continued). ATI Report Processing

| REPORT NAME | OUTPUT WHEN | DPMOD ENTRY | DATA PROVIDED IN REPORT |
|-----------------------------------|---|---------------|---|
| ATI;8210 SRI REPORT | Generated when an incoming target matches criteria established in SRI. | None required | Number of targets satisfying level 1 request, one line report of each target for level 2 request, and complete output report for level 3 request. |
| ATI;8211 ATI;SITUATION REPORT | Generated when ATI;COMD message is entered with options PRINT and SITREP. | None required | Number of targets satisfying level 1 request, one line report of each target for level 2 request, and complete output report for level 3 request. |
| ATI;8212 RETRIEVAL REPORT | Generated in response to ATI;SRCH message. | None required | Number of targets satisfying level 1 request, one line report of each target for level 2 request, and complete output report for level 3 request. |
| ATI;8213 ATI MOD LIST | Generated when ATI;COMD is entered with options PRINT and MOD FILE. | None required | Contents of ATI;FMMOD, ATI;SVMOD, ATI;TBMOD, ATI;DPMOD, and all SRIs. |
| ATI;8214 REPORT ACCURACY TABLE | Generates when ATI;COMD is entered with options PRINT and ACCURACY TABLE. | None required | Table for each of the 20 target acquisition agencies with their assumed accuracy in meters and azimuth in mils when locating each of the 20 target types. |

Figure D-5 (continued). ATI Report Processing

| REPORT NAME | OUTPUT WHEN | DPMOD ENTRY | DATA PROVIDED IN REPORT |
|---|---|--------------------|---|
| ATI;8215 RANGE ERROR TABLE | Generates when ATI;COMD is entered with options PRINT and RG ERROR TABLE. | None required | Table for each of the 4 human target acquisition agencies with assumed accuracy in estimating distance. |

Figure D-5 (continued). ATI Report Processing**(reverse blank)**

Appendix E

Message Distribution

The figures in this appendix display the MCFSS flow of messages in graphical and tabular form to support the data requirements of all stations. The figures presented here support the **MOI**, **DEFAULT DESTINATION**, and **ATI;SRI** setup described in chapter 2. Each graphical figure is associated with the tabular figure immediately following it. The message flow displayed in figure E-1 is described by steps in the tabular figure E-2, the message flow displayed in figure E-3 is described by steps in the tabular figure E-4, etc. The numbered and lettered steps in associated figures correspond.

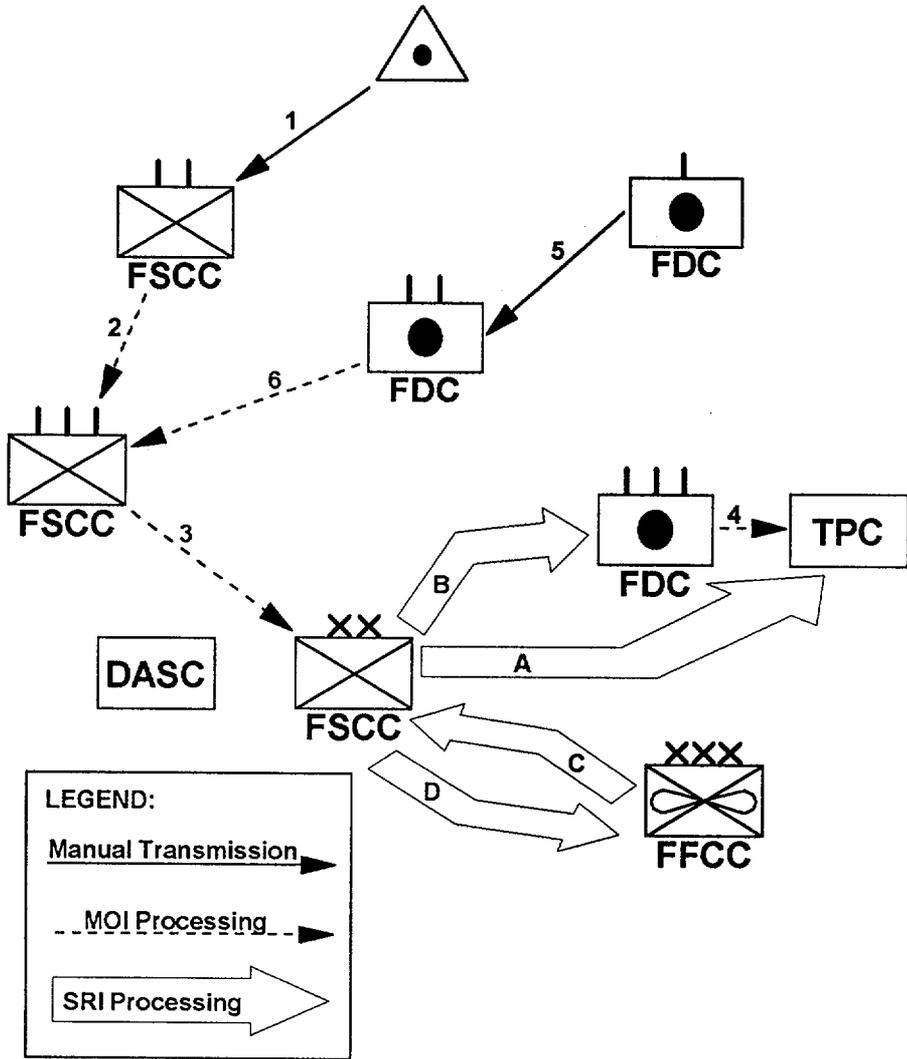


Figure E-1. ATI Message Exchange Flow

| STEP | REMARKS |
|---|--|
| 1. FO transmits ATI report. | Message is manually composed and transmitted. |
| 2. Battalion FSCC passes ATI report to regimental FSCC. | Message prints but does not display. Battalion FSCC is setup in ATI MODE 1 with an MOI established for ATI;CDRs, ATI;SHRs, and ATI;AZRs for regimental FSCC. |
| 3. Regimental FSCC passes message to division FSCC. | Message prints but does not display. Regimental FSCC automatically retransmits message to division FSCC by MOI established for all ATI target messages. |
| 4. Regimental FDC passes ATI messages to TPC. | Regimental FDC passes all ATI reports to TPC via MOI processing. |
| 5. Battery FDC transmits ATI reports to battalion FDC. | Battery FDC manually transmits any composed or received ATI reports to battalion FDC. |
| 6. Battalion FDC passes ATI reports to supported regimental FSCC. | Battalion FDC transmits any ATI reports received or transmitted via MOI processing to regimental FSCC. |
| A. TPC had already established SRIs at division FSCC. | TPC receives counterfire targets from division FSCC via level 3 SRIs established there. The 3 SRIs transmit all RKTMSL, ARTY, and MORT targets from division FSCC as they are received. |
| B. Regimental FDC had already established SRIs at division FSCC. | Regimental FDC receives counterfire targets from division FSCC via level 3 SRIs established there to complete TPC counterfire file. The 3 SRIs transmit all SUPPLY/AMMO, EQUIP/RADAR, and PERS/OP targets from division FSCC as they are received. Targets are retransmitted to TPC via MOI processing. (See step 5.) |
| C. Division FSCC had already established SRIs at MEF FFCC. | MEF FFCC establishes SRI at division FSCC to receive all targets beyond the FSCL. |
| D. MEF FFCC had already established SRIs at division FSCC. | Division FSCC establishes SRI at MEF FFCC to receive all targets short of the FSCL. |

Figure E-2. ATI Message Exchange Steps

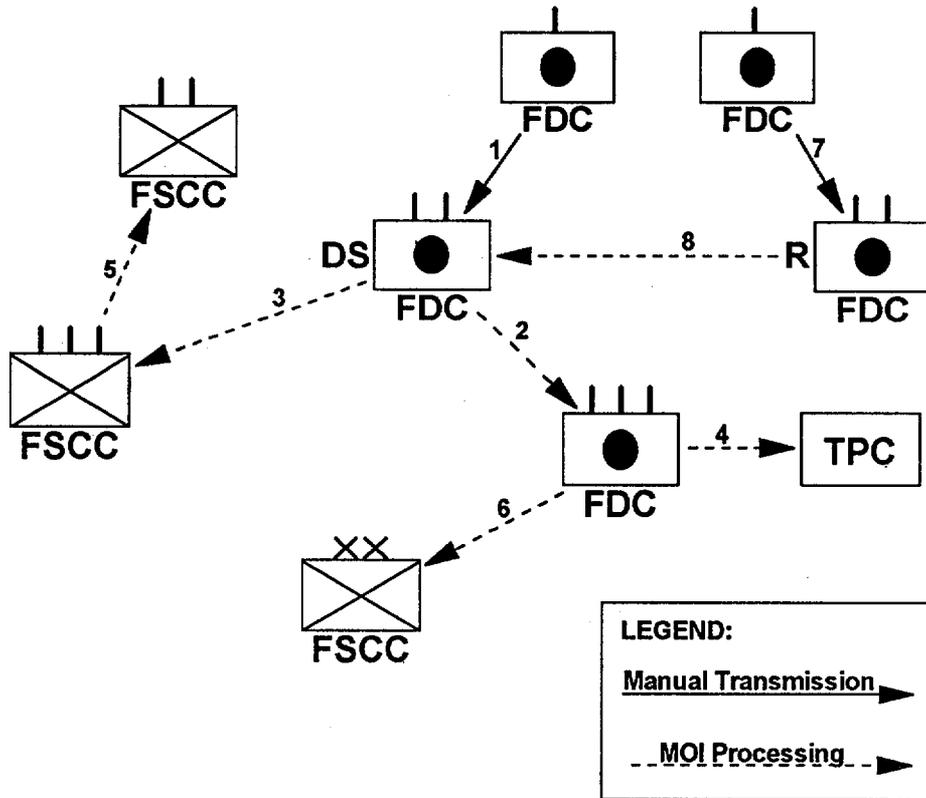


Figure E-3. AFU;UPDATE and AFU;AMMO Message Exchange Flow

| STEP | REMARKS |
|---|---|
| 1. Battery FDC transmits AFU;UPDATE and AFU;AMMO. | Message is manually composed and transmitted to the DS or GS battalion FDC. |
| 2. Battalion FDC passes AFU;UPDATE and AFU;AMMO messages to regimental FDC. | AFU messages are automatically transmitted to battalion FDC's default subscriber — regimental FDC. |
| 3. Battalion FDC passes AFU;UPDATEs and AMMOs to supported regimental FSCC. | This is accomplished by establishing an MOI for regimental FSCC for all incoming AFU;UPDATEs and AFU;AMMOs. |
| 4. Regimental FDC passes messages to TPC. | Regimental FDC passes messages via MOI processing. |
| 5. Regimental FSCC passes messages to subordinate battalion FSCCs. | Regimental FSCC passes messages via MOI processing using action and direction codes I/A. |
| 6. Regimental FDC passes AFU;UPDATEs and AFU;AMMO messages to division FSCC. | Messages are transmitted automatically via MOI processing. Message prints but does not display because of PCLD alterations. |
| 7. Battery FDCs of the R battalion transmit AFU;UPDATEs and AFU;AMMOs to the R battalion FDC. | Battery FDCs manually transmit messages. |
| 8. R battalion FDC passes AFU;UPDATEs and AMMOs to the supported DS battalion FDC. | <p>These messages are transmitted via default subscriber to supported DS battalion FDC by default subscriber processing at the R battalion FDC. (DS battalion FDC is the default subscriber.)</p> <p>NOTE: Version 10 BCS software will automatically generate AFU;AMMO:E at the end of each fire mission. These are processed through the system to maintain up-to-date ammunition count.</p> |

Figure E-4. AFU;UPDATE and AFU;AMMO Message Exchange Steps

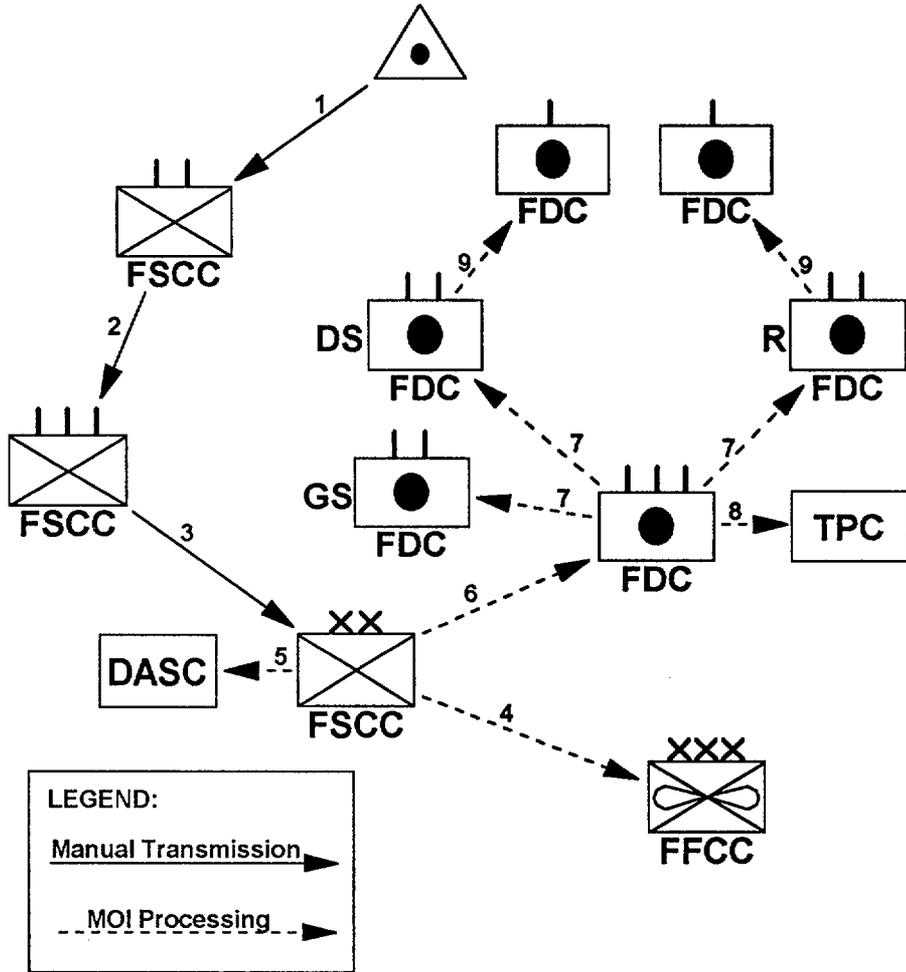


Figure E-5. SPRT;BGEOM and SPRT;ZONE Message Exchange Flow

| STEP | REMARKS |
|--|---|
| 1. FO transmits FLOT message to battalion FSCC. | Message is manually composed and transmitted to battalion FSCC. |
| 2. Battalion FSCC passes SPRT messages to regimental FSCC. | Battalion FSCC checks and corrects FLOT messages received from FOs. These messages are received as errors. Battalion FSCC must enter plan name and FSCoord fields as well as check the points. FLOT, as well as other SPRT;BGEOM and SPRT;ZONE messages, are transmitted manually to regimental FSCC. |
| 3. Regimental FSCC passes SPRT messages to division FSCC. | Regimental FSCC passes messages by manually transmitting any support message received from a lower echelon station. |
| 4. Division FSCC passes messages to MEF FFCC. | Division FSCC passes messages via MOI processing. |
| 5. Division FSCC passes messages to DASC. | Messages are transmitted automatically via MOI processing. |
| 6. Division FSCC passes messages to regimental FDC. | Division FSCC automatically passes messages via MOI processing. Message prints but does not display at regimental FDC because of PCLD alterations. |
| 7. Regimental FDC passes SPRT messages to all battalion FDCs. | SPRT;BGEOMs and ZONES are transmitted to all battalion FDCs without regard to their missions. This facilitates changes in missions by requiring no change to these MOIs. Received messages print but do not display due to PCLD alterations. |
| 8. Regimental FDC passes message to TPC. | Regimental FDC automatically passes messages via MOI processing. Message prints but does not display at TPC because of PCLD alterations. |
| 9. Battalion FDC passes SPRT messages to subordinate battery FDCs. | Battalion FDC automatically passes messages via MOI processing. BCS can only store 1 ZONE, 1 FLOT, and 8 circular RFAs. All others must be printed and plotted manually. |

Figure E-6. SPRT;BGEOM and SPRT;ZONE Message Exchange Steps

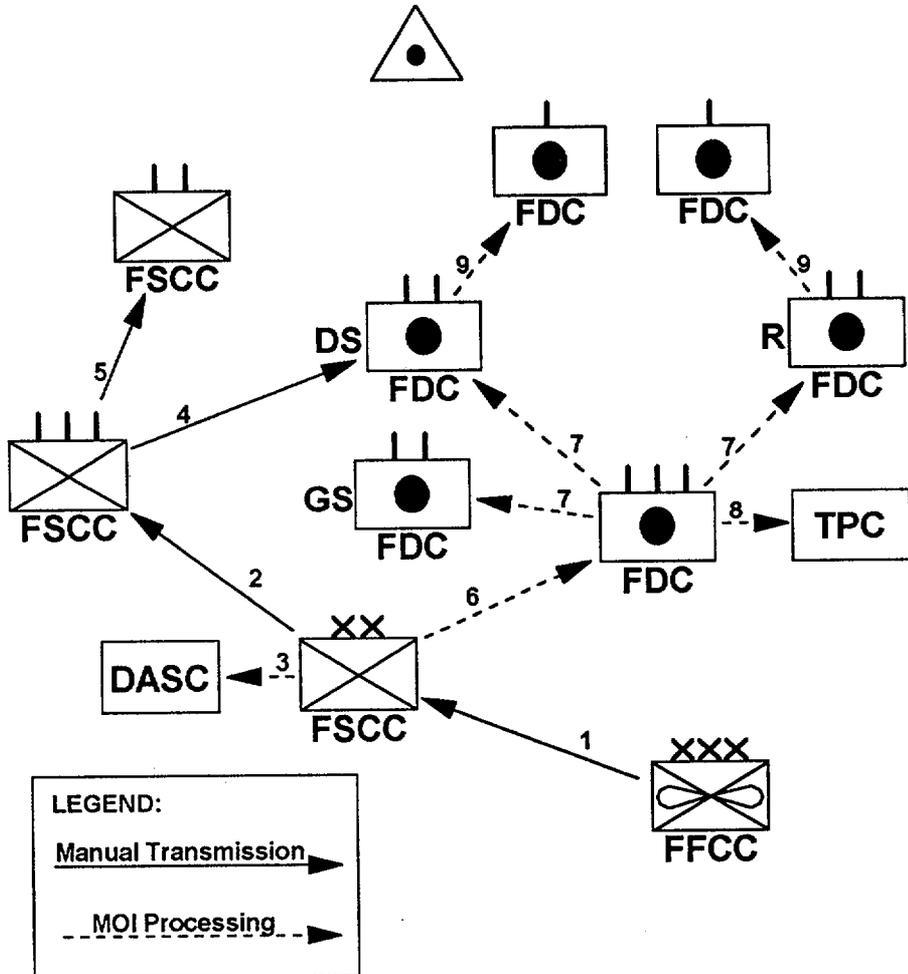


Figure E-7. SPRT;BGEOM and SPRT;ZONE Message Exchange Flow From Higher Echelon

NOTE: SPRT messages input at division FSCC or MEF FFCC are manually transmitted to the next lower level. Division uses a multisubscriber group to transmit to regiments. SPRT messages received from these stations or input by regimental FSCC must be manually transmitted to disseminate them to subordinate battalion FSCCs. Regimental FSCC uses a multisubscriber group to transmit to battalions.

| STEP | REMARKS |
|---|--|
| 1. MEF FFCC manually transmits SPRT;BGEOM and SPRT;ZONE to division FSCC. | Message is manually composed and transmitted. |
| 2. Division FSCC transmits SPRT messages to regimental FSCC. | Division FSCC transmits to a multisubscriber group R/E/G/TS/___ . This group is composed of all subordinate regimental FSCCs. |
| 3. Division FSCC passes message to DASC. | Message is automatically transmitted via MOI established for DASC with code I/A for SPRT;BGEOM and SPRT;ZONE . |
| 4. Regimental FSCC manually transmits SPRT messages to battalion FDC. | Regimental FSCC passes messages via MOI processing. Message prints but does not display at battalion FDC because of PCLD alterations. |
| 5. Regimental FSCC passes messages to battalion FSCC. | Regimental FSCC passes messages manually to multisubscriber group of all battalion FSCCs — B/N/F/SC/CS . |
| 6. Division FSCC passes SPRT data to regimental FDC. | Messages are transmitted automatically via MOI processing. Message prints at regimental FDC but does not display due to PCLD alterations. |
| 7. Regimental FDC passes SPRT messages to subordinate battalion FDCs. | Regimental FDC automatically passes the messages via MOI processing to all battalion FDCs without regard to mission. Message prints but does not display at battalion FDC because of PCLD alterations. |
| 8. Regimental FDC passes SPRT messages to TPC. | Regimental FDC automatically passes messages via MOI processing. Message prints but does not display at TPC because of PCLD alterations. |
| 9. Battalion FDC passes SPRT messages to battery FDCs. | Battalion FDC automatically passes messages via MOI processing. |

Figure E-8. SPRT;BGEOM and SPRT;ZONE Message Exchange Steps From Higher Echelon

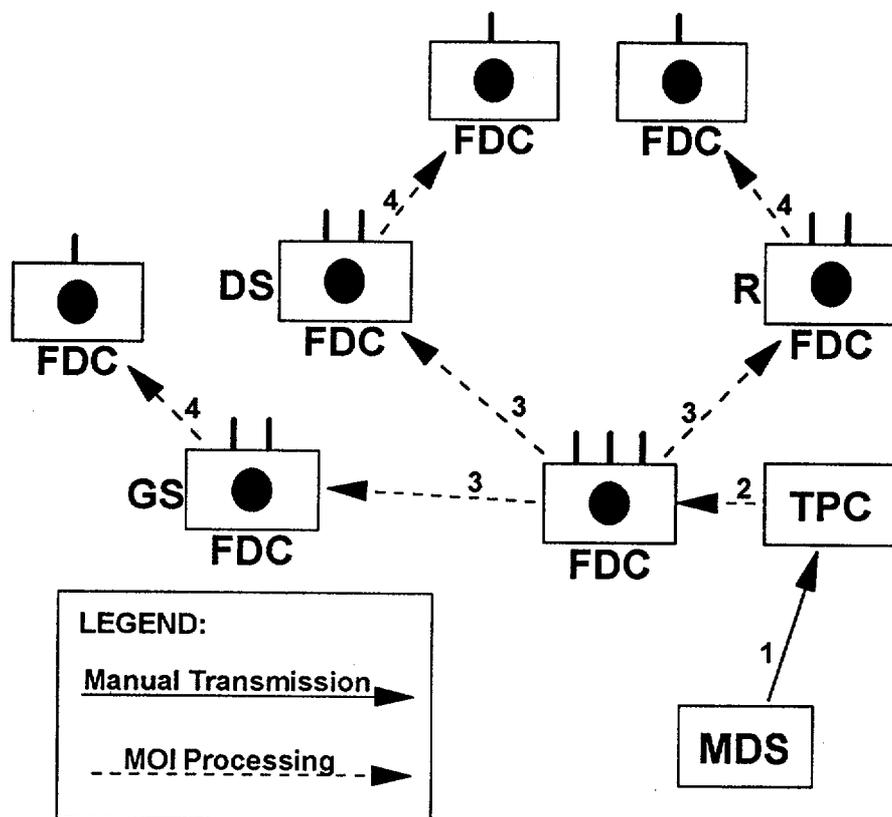


Figure E-9. MET;CM Message Exchange Flow

| STEP | REMARKS |
|--|---|
| 1. MDS transmits MET;CM message to TPC. | At TPC, the message is received and stored automatically without display because of PCLD alterations. |
| 2. TPC passes MET;CM to the regimental FDC. | MET;CM is passed to regimental FDC automatically via MOI processing. At regimental FDC, message is received and stored automatically without display because of PCLD alterations. |
| 3. Regimental FDC passes MET;CM messages to battalion FDC. | Regimental FDC passes the messages via MOI processing. |
| 4. Battalion FDC passes MET;CM to battery FDCs. | Battalion FDC is the first station at which MET;CM displays on the screen for review. MET;CM is actioned and automatically transmitted to battery FDCs. |

Figure E-10. MET;CM Message Exchange Steps

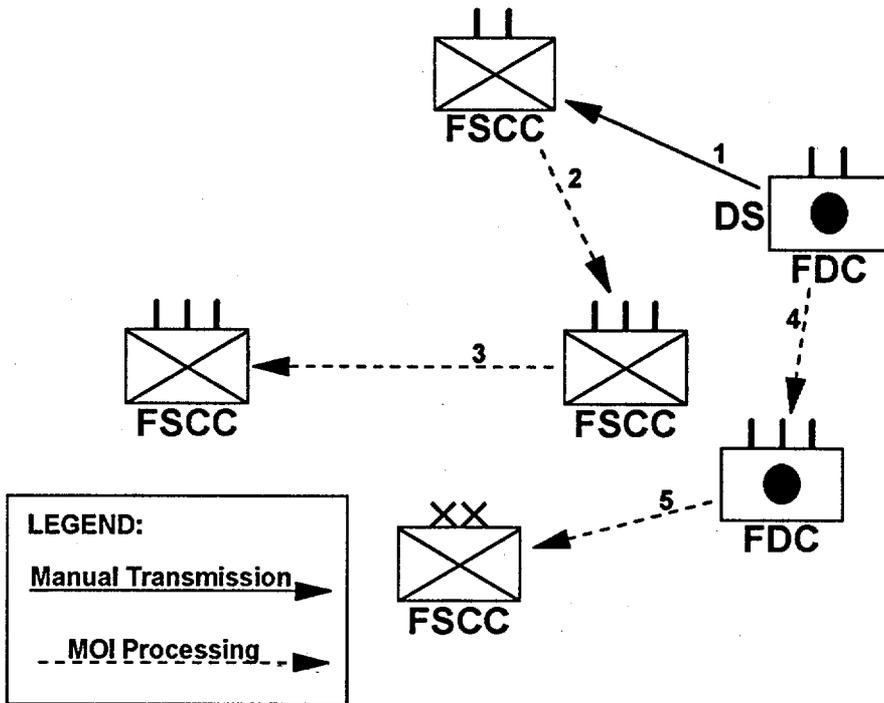


Figure E-11. AFU;MFR Message Exchange Flow

| STEP | REMARKS |
|---|--|
| 1. Battalion FDC passes AFU;MFR to battalion FSCC. | AFU;MFR is generated at battalion FDC at end of mission. Message is actioned and automatically transmitted to the battalion FSCC via MOI processing. |
| 2. Battalion FSCC passes AFU;MFR to regimental FSCC. | AFU;MFR is received from battalion FDC and actioned. Message is automatically transmitted to regimental FSCC via MOI processing using codes I/A. |
| 3. Regimental FSCC passes AFU;MFR to adjacent regimental FSCCs. | Regimental FSCC passes messages via MOI processing. MOI is established with action code B and adjacent regimental zone associated. |
| 4. Battalion FDC passes AFU;MFR to regimental FDC. | AFU;MFR is transmitted automatically via default subscriber processing. |
| 5. Regimental FDC passes AFU;MFR to division FSCC. | Message is automatically transmitted via MOI processing with codes I/A. |

Figure E-12. AFU;MFR Message Exchange Steps

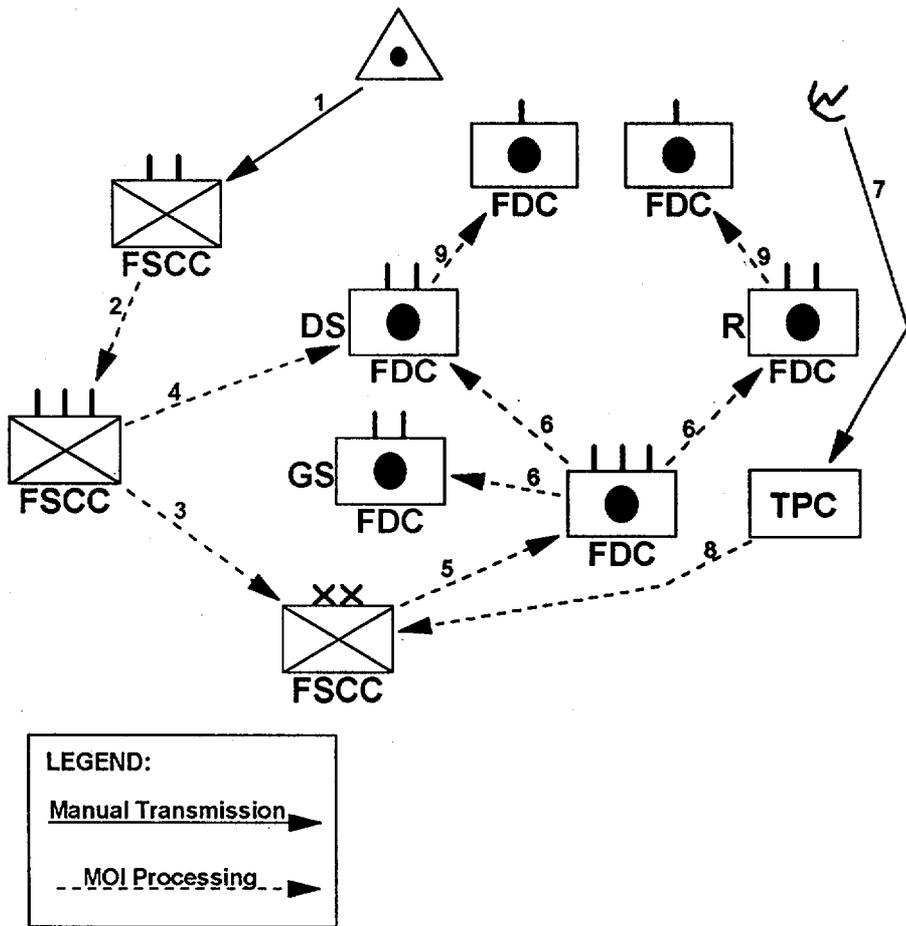


Figure E-13. FM;OBCO Message Exchange Flow

| STEP | REMARKS |
|--|--|
| 1. Observer passes OBSERVER LOCATION message to battalion FSCC. | Message is manually transmitted by observer. |
| 2. Battalion FSCC passes FM;OBCO to regimental FSCC. | FM;OBCO is transmitted to regimental FSCC via MOI processing. |
| 3. Regimental FSCC passes FM;OBCO to division FSCC. | This is accomplished automatically via MOI processing using codes I/A . |
| 4. Battalion FSCC passes FM;OBCO to DS battalion FDC. | Message is transmitted via MOI processing. This step is included, despite the fact that the message will also be transmitted down from regimental FDC, to provide timely processing of observer's location at battalion FDC. |
| 5. Division FSCC passes FM;OBCO to regimental FDC. | Message is transmitted via MOI processing using codes I/A . |
| 6. Regimental FDC passes FM;OBCO to all subordinate battalion FDCs. | Message is transmitted via MOI processing using codes I/A . This step shows message being received a second time by the FDC supporting the FO. |
| 7. RADAR locations are passed from the radar to TPC. | Message is manually composed and transmitted. |
| 8. TPC passes FM;OBCO to division FSCC. | Message is transmitted via MOI processing by relay through regimental FDC to provide warning of radar use in the area of operations. |
| 9. Battalion FDCs pass FM;OBCOs to subordinate battery FDCs. | Messages are passed via MOI processing. |

Figure E-14. FM;OBCO Message Exchange Steps

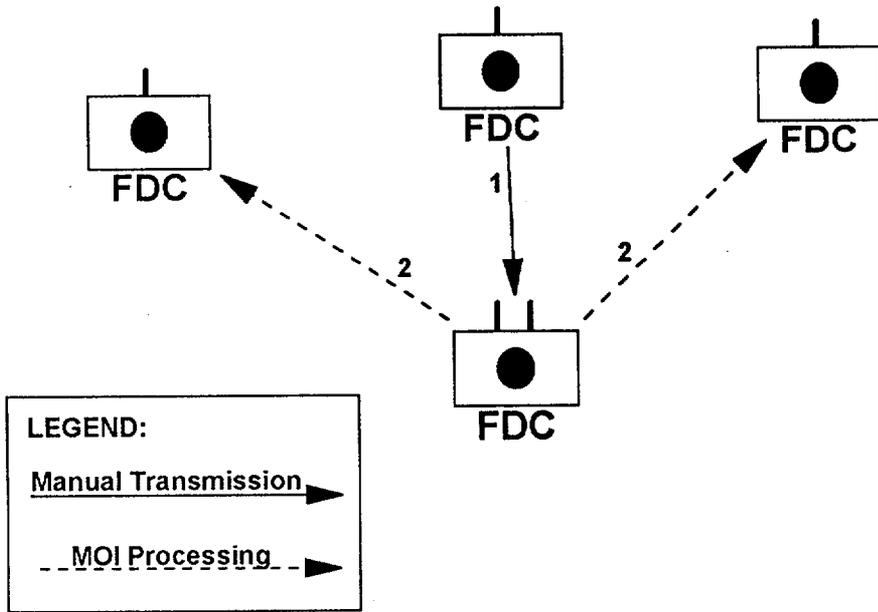


Figure E-15. AFU;REG Message Exchange Flow

| STEP | REMARKS |
|--|--|
| 1. Registered battery passes AFU;REG to battalion FDC. | Message is manually transmitted. At battalion FDC, AFU;REG is examined and actioned. |
| 2. Battalion FDC passes AFU;REG to subordinate battery FDCs. | Message is passed via MOI processing. |

Figure E-16. AFU;REG Message Exchange Steps

Appendix F

Combining Weight Tables

The Combining Weight Tables in this appendix reflect, by weighting value, each of the 20 target acquisition agencies' ability to report each element of the target description. A table exists for each of the following elements: type, subtype, DOP, and strength. Combined weight values are used in target comparison and combination. A larger value weighs toward a favorable comparison or combination. These weighting values cannot be changed by the operator.

| AGENCY ACQUIRING TARGET | PERS TARGET | | | | | | | WPN TARGET | | | | | | | MORT TARGET | | | | | | |
|-------------------------------|--------------|-----|-----|----|-----|-------|-----|--------------|-----|------|-----|------|------|-----|--------------|-----|----|-----|----|----|-----|
| | NOT GIVEN | UNK | INF | OP | PTL | WKPTY | POS | NOT GIVEN | UNK | LTMG | ATG | HVMG | RCLR | POS | NOT GIVEN | UNK | LT | MDM | HV | VH | POS |
| FO | 80 | 60 | 75 | 64 | 68 | 69 | 70 | 67 | 38 | 40 | 42 | 46 | 42 | 39 | 60 | 48 | 50 | 52 | 52 | 52 | 49 |
| TGTB | 7 | 59 | 73 | 67 | 69 | 70 | 72 | 70 | 39 | 40 | 43 | 48 | 43 | 39 | 66 | 54 | 57 | 58 | 58 | 58 | 55 |
| AOBSR | 81 | 71 | 78 | 76 | 73 | 73 | 72 | 70 | 39 | 41 | 43 | 49 | 43 | 40 | 69 | 56 | 58 | 59 | 63 | 64 | 57 |
| SORNG | 0 | 3 | 9 | 6 | 7 | 8 | 4 | 46 | 30 | 32 | 39 | 39 | 35 | 31 | 57 | 42 | 44 | 47 | 50 | 55 | 43 |
| FLRNG | 21 | 16 | 22 | 16 | 21 | 13 | 17 | 53 | 2 | 3 | 39 | 5 | 3 | 3 | 55 | 37 | 41 | 41 | 45 | 47 | 38 |
| CMRR | 6 | 3 | 6 | 5 | 6 | 5 | 4 | 6 | 2 | 4 | 6 | 5 | 3 | 3 | 79 | 57 | 59 | 63 | 68 | 70 | 58 |
| CBRR | 28 | 8 | 22 | 10 | 21 | 19 | 9 | 6 | 2 | 3 | 6 | 5 | 4 | 2 | 67 | 54 | 56 | 58 | 61 | 63 | 55 |
| FOWOL | 64 | 54 | 63 | 55 | 60 | 63 | 55 | 63 | 44 | 46 | 64 | 53 | 51 | 45 | 56 | 41 | 43 | 43 | 43 | 47 | 42 |
| PI | 50 | 42 | 47 | 41 | 44 | 45 | 43 | 53 | 41 | 42 | 42 | 42 | 42 | 42 | 53 | 39 | 45 | 46 | 48 | 49 | 50 |
| POW | 49 | 41 | 48 | 39 | 44 | 36 | 42 | 24 | 15 | 16 | 16 | 16 | 16 | 16 | 42 | 33 | 39 | 39 | 40 | 41 | 35 |
| GSRA | 63 | 33 | 56 | 27 | 53 | 49 | 34 | 26 | 15 | 16 | 16 | 16 | 16 | 16 | 25 | 16 | 22 | 22 | 23 | 24 | 17 |
| SLAR | 49 | 29 | 38 | 30 | 35 | 37 | 30 | 47 | 34 | 35 | 35 | 35 | 35 | 35 | 47 | 33 | 35 | 37 | 38 | 40 | 34 |
| IR | 54 | 36 | 44 | 37 | 41 | 43 | 37 | 53 | 43 | 44 | 44 | 44 | 44 | 44 | 57 | 44 | 46 | 46 | 46 | 46 | 45 |
| TACAIR | 44 | 16 | 35 | 17 | 26 | 31 | 17 | 30 | 19 | 20 | 20 | 20 | 20 | 20 | 29 | 17 | 19 | 21 | 22 | 24 | 18 |
| OBSR | 64 | 54 | 63 | 55 | 60 | 63 | 55 | 63 | 44 | 46 | 54 | 53 | 51 | 45 | 56 | 41 | 43 | 43 | 43 | 47 | 42 |
| COMINT | 40 | 20 | 32 | 36 | 21 | 22 | 21 | 19 | 15 | 16 | 16 | 16 | 16 | 16 | 29 | 22 | 23 | 23 | 23 | 23 | 23 |
| ELINT | 32 | 14 | 25 | 26 | 20 | 15 | 15 | 30 | 16 | 17 | 17 | 17 | 17 | 17 | 23 | 17 | 18 | 18 | 18 | 18 | 18 |
| LRRP | 70 | 51 | 58 | 58 | 57 | 58 | 62 | 60 | 39 | 41 | 44 | 45 | 41 | 40 | 67 | 56 | 57 | 58 | 58 | 59 | 58 |
| RPV | 81 | 71 | 81 | 71 | 78 | 76 | 73 | 70 | 39 | 41 | 43 | 49 | 43 | 40 | 69 | 56 | 58 | 59 | 63 | 64 | 57 |
| JSTARS | 64 | 54 | 64 | 55 | 60 | 63 | 55 | 63 | 44 | 46 | 64 | 53 | 51 | 45 | 56 | 41 | 43 | 43 | 43 | 47 | 42 |

| AGENCY ACQUIRING TARGET | ARTY TARGET | | | | | | | ARMOR TARGET | | | | | | | VEH TARGET | | | | | | | |
|-------------------------------|--------------|-----|----|-----|----|----|-----|--------------|-----|----|-----|-----------|------------|-----|--------------|-----|-------|--------------|-------|----|------|-----|
| | NOT GIVEN | UNK | LT | MDM | HV | VH | POS | NOT GIVEN | UNK | LT | MDM | HV (1) | APC (2) | POS | NOT GIVEN | UNK | LTWHL | HVWHL (3) | RECON | BT | ACFT | HEL |
| FO | 61 | 42 | 54 | 54 | 58 | 44 | 44 | 80 | 71 | 72 | 72 | 74 | 72 | 71 | 75 | 58 | 69 | 77 | 70 | 65 | 73 | 73 |
| TGTB | 67 | 50 | 65 | 63 | 62 | 51 | 51 | 76 | 69 | 70 | 70 | 72 | 70 | 70 | 73 | 58 | 69 | 73 | 69 | 61 | 63 | 63 |
| AOBSR | 80 | 71 | 72 | 73 | 75 | 76 | 72 | 85 | 76 | 78 | 78 | 80 | 78 | 76 | 83 | 66 | 76 | 80 | 78 | 78 | 81 | 80 |
| SORNG | 76 | 5 | 61 | 63 | 64 | 61 | 60 | 31 | 18 | 21 | 27 | 26 | 19 | 18 | 14 | 12 | 12 | 13 | 11 | 9 | 11 | 11 |
| FLRNG | 70 | 53 | 55 | 57 | 58 | 59 | 55 | 52 | 36 | 41 | 49 | 47 | 37 | 36 | 40 | 7 | 36 | 37 | 35 | 6 | 40 | 37 |
| CMRR | 62 | 45 | 51 | 52 | 53 | 53 | 52 | 16 | 11 | 9 | 15 | 15 | 9 | 11 | 8 | 7 | 5 | 6 | 5 | 8 | 10 | 9 |
| CBRR | 72 | 60 | 62 | 63 | 64 | 65 | 61 | 38 | 28 | 30 | 33 | 35 | 30 | 29 | 34 | 9 | 27 | 33 | 27 | 12 | 28 | 27 |
| FOWOL | 58 | 41 | 46 | 45 | 43 | -- | 42 | 71 | 58 | 60 | 61 | 62 | 60 | 59 | 69 | 50 | 58 | 62 | 57 | 51 | 59 | 58 |
| PI | 68 | 52 | 58 | 61 | 63 | 64 | 57 | 67 | 55 | 57 | 59 | 62 | 60 | 58 | 64 | 35 | 57 | 60 | 58 | 36 | 56 | 55 |
| POW | 47 | 43 | 44 | 44 | 44 | 44 | 44 | 42 | 36 | 37 | 39 | 40 | 37 | 37 | 39 | 27 | 36 | 36 | 36 | 36 | 36 | 35 |
| GSRA | 29 | 24 | 26 | 27 | 27 | 28 | 25 | 72 | 60 | 62 | 68 | 67 | 64 | 61 | 70 | 26 | 68 | 74 | 70 | 66 | 44 | 27 |
| SLAR | 58 | 44 | 46 | 47 | 48 | 49 | 45 | 74 | 57 | 59 | 61 | 63 | 60 | 58 | 71 | 45 | 58 | 61 | 57 | 56 | 47 | 46 |
| IR | 63 | 48 | 50 | 51 | 52 | 53 | 49 | 77 | 60 | 62 | 65 | 68 | 63 | 61 | 74 | 42 | 61 | 63 | 60 | 59 | 44 | 43 |
| TACAIR | 51 | 39 | 41 | 43 | 46 | 50 | 40 | 60 | 39 | 46 | 52 | 57 | 44 | 40 | 62 | 40 | 48 | 53 | 47 | 41 | 61 | 60 |
| OBSR | 58 | 41 | 46 | 45 | 43 | 43 | 42 | 71 | 58 | 60 | 61 | 62 | 60 | 59 | 69 | 50 | 58 | 62 | 57 | 51 | 59 | 58 |
| COMINT | 37 | 28 | 29 | 29 | 29 | 29 | 29 | 37 | 25 | 28 | 28 | 28 | 27 | 26 | 32 | 17 | 19 | 19 | 23 | 18 | 25 | 25 |
| ELINT | 29 | 21 | 22 | 22 | 22 | 22 | 22 | 29 | 18 | 22 | 22 | 22 | 20 | 19 | 24 | 9 | 12 | 12 | 16 | 10 | 23 | 23 |
| LRRP | 68 | 42 | 56 | 58 | 58 | 59 | 52 | 72 | 62 | 64 | 65 | 67 | 64 | 63 | 72 | 60 | 64 | 65 | 63 | 62 | 63 | 65 |
| RPV | 80 | 71 | 72 | 73 | 75 | 76 | 72 | 85 | 76 | 78 | 78 | 80 | 78 | 76 | 83 | 86 | 76 | 80 | 78 | 78 | 81 | 80 |
| JSTARS | 58 | 41 | 46 | 45 | 43 | -- | 42 | 71 | 58 | 60 | 61 | 62 | 60 | 59 | 69 | 50 | 58 | 62 | 57 | 51 | 59 | 58 |

- NOTES: (1) ARMOR/HV values also apply to target type/subtypes:
FORM/AGBTKB, FORM/TNKBNM, FORM/TNKBNS,
ASSY/TNKBNT, and ASSY/TNKBNA.
- (2) ARMOR/APC values also apply to target type/subtypes:
FORM/AGBBTR, FORM/AGBBMP, FORM/MRBMNR,
FORM/MRBBNP, FORM/MRBSPR, FORM/MRBSPP,
ASSY/TACBTR, ASSY/ADMBTR, ASSY/ADMBTR,
ASSY/ADMBMP, and ASSY/TACBMP.
- (3) VEH/HVWHL values also apply to target type/subtypes:
ASSY/SPRTEL.

| AGENCY ACQUIRING TARGET | RKTMSL TARGET | | | | | | | | SUPPLY TARGET | | | | | | |
|-------------------------------|---------------|-----|-------|-------|-------|-------|-------|-----|---------------|-----|------|-----|-------|-----|-----|
| | NOT GIVEN | UNK | APERS | LTMSL | MDMSL | VHMSL | ATANK | POS | NOT GIVEN | UNK | AMMO | PTL | BRGEQ | CLI | CLI |
| FO | 53 | 33 | 44 | 44 | 44 | 36 | 36 | 46 | 62 | 51 | 52 | 52 | 52 | 52 | 52 |
| TGTB | 59 | 34 | 50 | 50 | 50 | 45 | 37 | 52 | 62 | 50 | 51 | 51 | 51 | 51 | 51 |
| AOSBR | 64 | 53 | 56 | 56 | 62 | 65 | 56 | 58 | 81 | 63 | 64 | 64 | 64 | 64 | 64 |
| SORNG | 31 | 17 | 23 | 24 | 26 | 26 | 21 | 21 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| FLRNG | 53 | 34 | 42 | 43 | 46 | 48 | 41 | 48 | 14 | 8 | 9 | 9 | 9 | 9 | 9 |
| CMRR | 32 | 18 | 23 | 25 | 27 | 29 | 31 | 38 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CBRR | 43 | 37 | 31 | 32 | 34 | 36 | 29 | 44 | 6 | 3 | 3 | 3 | 3 | 3 | 4 |
| FOWOL | 31 | 34 | 41 | 40 | 40 | 36 | 35 | 45 | 49 | 39 | 40 | 40 | 40 | 40 | 40 |
| PI | 61 | 39 | 41 | 54 | 56 | 55 | 40 | 40 | 77 | 64 | 65 | 68 | 65 | 65 | 65 |
| POW | 40 | 31 | 34 | 34 | 35 | 36 | 32 | 32 | 50 | 41 | 42 | 42 | 42 | 42 | 42 |
| GSRA | 23 | 17 | 20 | 20 | 21 | 22 | 18 | 18 | 15 | 9 | 10 | 10 | 10 | 10 | 10 |
| SLAR | 58 | 38 | 41 | 40 | 46 | 51 | 39 | 40 | 60 | 48 | 49 | 49 | 49 | 49 | 49 |
| IR | 60 | 41 | 44 | 43 | 47 | 53 | 52 | 45 | 47 | 36 | 37 | 37 | 37 | 37 | 37 |
| TACAIR | 56 | 35 | 38 | 37 | 47 | 55 | 36 | 39 | 68 | 56 | 57 | 57 | 57 | 57 | 57 |
| OBSR | 51 | 34 | 41 | 40 | 40 | 36 | 35 | 45 | 49 | 39 | 40 | 40 | 40 | 40 | 40 |
| COMINT | 31 | 19 | 20 | 24 | 24 | 24 | 24 | 24 | 28 | 21 | 22 | 22 | 22 | 22 | 22 |
| ELINT | 32 | 17 | 18 | 25 | 25 | 25 | 25 | 25 | 22 | 17 | 18 | 18 | 18 | 18 | 18 |
| LRRP | 68 | 58 | 58 | 54 | 58 | 64 | 53 | 54 | 80 | 67 | 69 | 69 | 69 | 69 | 69 |
| RPV | 64 | 53 | 56 | 56 | 62 | 65 | 56 | 58 | 81 | 63 | 64 | 64 | 64 | 64 | 64 |
| JSTARS | 31 | 34 | 41 | 40 | 40 | 36 | 35 | 45 | 49 | 39 | 40 | 40 | 40 | 40 | 40 |

| AGENCY ACQUIRING TARGET | CENTER TARGET | | | | | | | EQUIP TARGET | | | | | | |
|-------------------------------|---------------|-----|-------|----|------|-----|-----|--------------|-----|-------|----|-----|------|----|
| | NOT GIVEN | UNK | SMALL | BN | REGT | DIV | FWD | NOT GIVEN | UNK | RADAR | EW | SLT | GDNC | LS |
| FO | 63 | 52 | 60 | 58 | 55 | 53 | 62 | 60 | 47 | 48 | 48 | 48 | 48 | 48 |
| TGTB | 62 | 51 | 59 | 58 | 55 | 53 | 61 | 62 | 49 | 50 | 50 | 50 | 50 | 50 |
| AOBSR | 77 | 61 | 62 | 66 | 68 | 70 | 72 | 69 | 54 | 55 | 55 | 55 | 55 | 55 |
| SORNG | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| FLRNG | 17 | 3 | 9 | 7 | 4 | 4 | 4 | 13 | 7 | 8 | 8 | 8 | 8 | 8 |
| CMRR | 4 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CBRR | 9 | 6 | 7 | 7 | 6 | 6 | 6 | 3 | 1 | 2 | 1 | 1 | 1 | 1 |
| FOWOL | 48 | 36 | 42 | 40 | 39 | 37 | 46 | 50 | 40 | 41 | 41 | 41 | 41 | 41 |
| PI | 65 | 48 | 49 | 53 | 55 | 57 | 59 | 53 | 40 | 41 | 41 | 41 | 41 | 41 |
| POW | 48 | 39 | 40 | 40 | 40 | 40 | 40 | 25 | 17 | 18 | 18 | 18 | 18 | 18 |
| GSRA | 21 | 12 | 13 | 14 | 15 | 17 | 16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| SLAR | 57 | 45 | 49 | 53 | 55 | 57 | 46 | 56 | 43 | 44 | 44 | 44 | 44 | 44 |
| IR | 44 | 29 | 30 | 34 | 36 | 38 | 32 | 40 | 31 | 32 | 32 | 39 | 32 | 32 |
| TACAIR | 62 | 43 | 46 | 51 | 52 | 53 | 44 | 51 | 41 | 42 | 42 | 42 | 42 | 42 |
| OBSR | 48 | 36 | 42 | 40 | 39 | 37 | 46 | 50 | 40 | 41 | 41 | 41 | 41 | 41 |
| COMINT | 44 | 36 | 37 | 37 | 37 | 37 | 37 | 19 | 7 | 19 | 19 | 4 | 18 | 8 |
| ELINT | 40 | 31 | 32 | 32 | 32 | 32 | 32 | 21 | 4 | 21 | 20 | 5 | 19 | 5 |
| LRRP | 62 | 51 | 52 | 52 | 52 | 52 | 52 | 51 | 41 | 42 | 42 | 42 | 42 | 42 |
| RPV | 77 | 61 | 62 | 66 | 68 | 70 | 72 | 69 | 54 | 55 | 55 | 55 | 55 | 55 |
| JSTARS | 48 | 36 | 42 | 40 | 39 | 37 | 46 | 50 | 40 | 41 | 41 | 41 | 41 | 41 |

| AGENCY ACQUIRING TARGET | BLDG TARGET | | | | | | BRIDGE TARGET | | | | | | | | | | |
|-------------------------|-------------|-----|------|--------|------|-----|---------------|-----------|-----|-------|--------|------|------|-------|------|------|-------|
| | NOT GIVEN | UNK | WOOD | MASNRY | CONC | MET | SPCL | NOT GIVEN | UNK | FTPON | VEHPON | CONC | WOOD | STEEL | SITE | RAFT | FERRY |
| FO | 80 | 63 | 64 | 64 | 64 | 65 | 64 | 61 | 65 | 62 | 65 | 66 | 66 | 67 | 61 | 60 | 63 |
| TGTB | 78 | 62 | 63 | 63 | 63 | 64 | 63 | 48 | 56 | 61 | 64 | 65 | 65 | 66 | 60 | 57 | 59 |
| AOBSR | 89 | 70 | 72 | 72 | 72 | 73 | 71 | 91 | 62 | 67 | 70 | 73 | 74 | 75 | 65 | 63 | 66 |
| SORNG | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| FLRNG | 18 | 13 | 14 | 14 | 14 | 14 | 14 | 17 | 12 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 |
| CMRR | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 |
| CBRR | 5 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 |
| FOWOL | 70 | 57 | 59 | 59 | 59 | 58 | 58 | 75 | 58 | 62 | 63 | 64 | 64 | 65 | 60 | 59 | 62 |
| PI | 84 | 60 | 65 | 63 | 62 | 64 | 61 | 62 | 67 | 70 | 70 | 71 | 71 | 71 | 66 | 65 | 68 |
| POW | 50 | 40 | 41 | 41 | 41 | 41 | 41 | 54 | 46 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 |
| GSRA | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| SLAR | 72 | 47 | 48 | 48 | 48 | 54 | 46 | 72 | 48 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| IR | 47 | 32 | 33 | 33 | 33 | 34 | 33 | 44 | 23 | 26 | 29 | 30 | 30 | 32 | 25 | 24 | 27 |
| TACAIR | 73 | 64 | 65 | 65 | 65 | 65 | 65 | 75 | 57 | 58 | 58 | 58 | 58 | 59 | 58 | 58 | 58 |
| OBSR | 70 | 57 | 59 | 59 | 59 | 58 | 58 | 76 | 58 | 62 | 63 | 64 | 64 | 65 | 60 | 59 | 62 |
| COMINT | 9 | 5 | 6 | 6 | 6 | 6 | 6 | 7 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| ELINT | 8 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| LRRP | 77 | 67 | 69 | 65 | 65 | 68 | 68 | 76 | 65 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| RPV | 89 | 70 | 72 | 72 | 72 | 73 | 71 | 91 | 62 | 67 | 70 | 73 | 74 | 75 | 65 | 63 | 66 |
| JSTARS | 70 | 57 | 59 | 59 | 59 | 58 | 58 | 75 | 58 | 62 | 63 | 64 | 64 | 65 | 60 | 59 | 62 |

| AGENCY ACQUIRING TARGET | TERR TARGET | | | | | | | | ASSY TARGET | | | | | ADA TARGET | | | | | | | |
|-------------------------------|--------------|-----|------|-----|------|-------|--------|----|--------------|-----|-----|--------|---------|------------|--------------|-----|----|-----|----|-----|-----|
| | NOT GIVEN | UNK | ROAD | JCT | HILL | DEFIL | LDGSTR | RR | NOT GIVEN | UNK | TRP | TRPVEH | TRPMECH | TRPPARM | NOT GIVEN | UNK | LT | MDM | HV | MSL | POS |
| FO | 82 | 68 | 69 | 69 | 69 | 69 | 69 | 69 | 63 | 49 | 50 | 53 | 53 | 53 | 53 | 36 | 36 | 40 | 42 | 34 | 33 |
| TGTB | 70 | 65 | 66 | 66 | 66 | 66 | 66 | 66 | 62 | 48 | 49 | 52 | 51 | 54 | 54 | 35 | 40 | 43 | 44 | 37 | 36 |
| AOBSR | 83 | 70 | 71 | 71 | 71 | 71 | 71 | 71 | 75 | 66 | 67 | 69 | 68 | 71 | 74 | 53 | 60 | 62 | 65 | 55 | 54 |
| SORNG | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 4 | 1 | 2 | 3 | 3 | 3 | 73 | 56 | 58 | 61 | 63 | 39 | 57 |
| FLRNG | 18 | 2 | 14 | 14 | 13 | 12 | 12 | 14 | 15 | 12 | 13 | 13 | 13 | 13 | 13 | 42 | 15 | 31 | 38 | 40 | 30 |
| CMRR | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 4 | 1 | 2 | 3 | 3 | 3 | 61 | 44 | 50 | 51 | 52 | 52 | 51 |
| CBRR | 5 | 1 | 3 | 3 | 1 | 1 | 1 | 3 | 13 | 10 | 11 | 11 | 11 | 11 | 72 | 59 | 61 | 62 | 63 | 64 | 60 |
| FOWOL | 72 | 61 | 62 | 62 | 62 | 62 | 62 | 62 | 57 | 45 | 46 | 48 | 47 | 49 | 47 | 30 | 31 | 34 | 37 | 40 | 32 |
| PI | 79 | 70 | 71 | 71 | 71 | 71 | 71 | 71 | 63 | 50 | 51 | 56 | 55 | 57 | 53 | 31 | 45 | 46 | 47 | 49 | 48 |
| POW | 47 | 39 | 40 | 40 | 40 | 40 | 40 | 40 | 46 | 39 | 41 | 41 | 41 | 41 | 42 | 33 | 34 | 34 | 34 | 34 | 34 |
| GSRA | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 30 | 24 | 25 | 29 | 27 | 28 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| SLAR | 59 | 47 | 48 | 48 | 48 | 48 | 48 | 48 | 57 | 44 | 45 | 51 | 49 | 53 | 58 | 42 | 43 | 46 | 45 | 46 | 44 |
| IR | 31 | 26 | 27 | 27 | 27 | 27 | 27 | 27 | 51 | 39 | 40 | 46 | 45 | 48 | 57 | 39 | 41 | 44 | 46 | 47 | 40 |
| TACAIR | 69 | 58 | 59 | 59 | 59 | 59 | 59 | 59 | 58 | 39 | 40 | 48 | 47 | 49 | 68 | 49 | 52 | 58 | 60 | 62 | 50 |
| OBSR | 72 | 61 | 62 | 62 | 62 | 62 | 62 | 62 | 57 | 45 | 46 | 48 | 47 | 49 | 47 | 30 | 31 | 34 | 37 | 40 | 32 |
| COMINT | 6 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 37 | 27 | 28 | 28 | 28 | 28 | 33 | 22 | 24 | 25 | 26 | 26 | 23 |
| ELINT | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 28 | 21 | 22 | 22 | 22 | 22 | 42 | 30 | 34 | 35 | 36 | 40 | 34 |
| LRRP | 69 | 58 | 59 | 59 | 59 | 59 | 59 | 59 | 63 | 51 | 52 | 55 | 54 | 57 | 52 | 30 | 45 | 48 | 49 | 49 | 48 |
| RPV | 83 | 70 | 71 | 71 | 71 | 71 | 71 | 71 | 75 | 66 | 67 | 69 | 68 | 71 | 74 | 53 | 60 | 62 | 65 | 55 | 54 |
| JSTARS | 72 | 61 | 62 | 62 | 62 | 62 | 62 | 62 | 57 | 45 | 46 | 48 | 47 | 49 | 47 | 30 | 31 | 34 | 37 | 40 | 32 |

| AGENCY ACQUIRING TARGET | DOP | | | | | | SIZE | | STR | |
|-------------------------------|-------|-------|--------|-------|------|-------|-------|-----|-------|-----|
| | COVER | DUGIN | PROVER | PRONE | PRUG | PRAID | KNOWN | UNK | KNOWN | UNK |
| FO | 77 | 64 | 55 | 50 | 52 | 49 | 77 | 10 | 75 | 10 |
| TGTB | 73 | 63 | 53 | 49 | 51 | 49 | 76 | 10 | 71 | 10 |
| AOBSR | 77 | 66 | 60 | 43 | 56 | 50 | 84 | 10 | 81 | 10 |
| SORNG | 6 | 4 | 4 | 4 | 5 | 4 | 23 | 10 | 26 | 10 |
| FLRNG | 21 | 18 | 14 | 12 | 14 | 12 | 38 | 10 | 33 | 10 |
| CMRR | 5 | 5 | 6 | 5 | 4 | 4 | 27 | 10 | 23 | 10 |
| CBRR | 7 | 4 | 6 | 6 | 6 | 4 | 27 | 10 | 24 | 10 |
| FOWOL | 76 | 63 | 51 | 54 | 48 | 49 | 75 | 10 | 75 | 10 |
| PI | 51 | 49 | 49 | 39 | 42 | 38 | 74 | 10 | 68 | 10 |
| POW | 29 | 28 | 32 | 33 | 30 | 31 | 49 | 10 | 47 | 10 |
| GSRA | 32 | 14 | 10 | 10 | 11 | 11 | 41 | 10 | 39 | 10 |
| SLAR | 25 | 21 | 21 | 20 | 20 | 22 | 52 | 10 | 43 | 10 |
| IR | 27 | 24 | 20 | 18 | 19 | 18 | 49 | 10 | 44 | 10 |
| TACAIR | 41 | 39 | 39 | 34 | 37 | 35 | 55 | 10 | 48 | 10 |
| OBSR | 71 | 63 | 54 | 49 | 51 | 48 | 75 | 10 | 69 | 10 |
| COMINT | 1 | 1 | 1 | 1 | 1 | 1 | 26 | 10 | 22 | 10 |
| ELINT | 1 | 1 | 1 | 1 | 1 | 1 | 23 | 10 | 22 | 10 |
| LRRP | 70 | 62 | 53 | 48 | 50 | 47 | 74 | 10 | 68 | 10 |
| RPV | 77 | 66 | 60 | 43 | 56 | 50 | 84 | 10 | 81 | 10 |
| JSTARS | 76 | 63 | 51 | 54 | 48 | 49 | 75 | 10 | 75 | 10 |

(reverse blank)

Appendix G

Separation Distance Tables

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |

INDEX

RPF=50

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.5 | 7 | 11 | 13 | 14 | 15 | 16 | 17 | 18 | 18 | 19 | 20 | 20 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 |
| 3.0 | 14 | 23 | 27 | 29 | 31 | 33 | 34 | 36 | 37 | 38 | 40 | 41 | 42 | 43 | 44 | 44 | 44 | 44 | 45 | 45 | 45 | 46 | 46 | 47 |
| 2.5 | 20 | 35 | 40 | 43 | 47 | 50 | 51 | 54 | 56 | 57 | 60 | 62 | 64 | 65 | 66 | 66 | 66 | 67 | 67 | 68 | 68 | 70 | 70 | 70 |
| 2.0 | 20 | 45 | 54 | 58 | 62 | 66 | 68 | 72 | 75 | 76 | 80 | 83 | 85 | 87 | 88 | 88 | 89 | 89 | 90 | 90 | 91 | 93 | 93 | 94 |
| 1.5 | 20 | 45 | 60 | 70 | 78 | 83 | 85 | 91 | 93 | 95 | 100 | 104 | 107 | 109 | 110 | 111 | 111 | 112 | 112 | 113 | 114 | 116 | 117 | 117 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 103 | 109 | 112 | 114 | 120 | 125 | 128 | 131 | 132 | 133 | 133 | 134 | 135 | 136 | 137 | 140 | 140 | 141 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 127 | 131 | 133 | 140 | 145 | 150 | 153 | 154 | 155 | 155 | 156 | 157 | 159 | 160 | 163 | 164 | 164 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 152 | 160 | 166 | 171 | 175 | 177 | 177 | 178 | 179 | 180 | 181 | 183 | 186 | 187 | 188 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 152 | 180 | 187 | 192 | 197 | 199 | 200 | 200 | 201 | 202 | 204 | 206 | 210 | 210 | 211 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 208 | 214 | 219 | 221 | 222 | 222 | 224 | 225 | 227 | 228 | 233 | 234 | 235 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 229 | 235 | 241 | 243 | 244 | 245 | 246 | 247 | 250 | 252 | 256 | 257 | 258 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 257 | 263 | 265 | 266 | 267 | 269 | 270 | 272 | 275 | 280 | 281 | 282 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 278 | 285 | 287 | 288 | 289 | 291 | 292 | 295 | 297 | 303 | 304 | 305 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 307 | 309 | 311 | 311 | 313 | 315 | 318 | 320 | 326 | 328 | 329 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 329 | 331 | 333 | 334 | 336 | 337 | 340 | 343 | 350 | 351 | 352 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 351 | 354 | 355 | 356 | 358 | 360 | 363 | 366 | 373 | 375 | 376 |

RPF=100

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.5 | 8 | 15 | 18 | 20 | 22 | 25 | 26 | 28 | 30 | 30 | 33 | 35 | 37 | 39 | 39 | 40 | 40 | 40 | 40 | 41 | 42 | 43 | 44 | 44 |
| 3.0 | 16 | 31 | 37 | 41 | 45 | 50 | 52 | 57 | 60 | 61 | 66 | 71 | 75 | 78 | 79 | 80 | 80 | 81 | 81 | 83 | 84 | 87 | 88 | 88 |
| 2.5 | 20 | 45 | 56 | 61 | 68 | 75 | 78 | 86 | 90 | 92 | 100 | 107 | 112 | 117 | 119 | 120 | 120 | 121 | 122 | 125 | 126 | 131 | 132 | 133 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 114 | 120 | 123 | 133 | 142 | 150 | 156 | 158 | 160 | 160 | 162 | 163 | 166 | 169 | 175 | 176 | 177 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 153 | 166 | 178 | 187 | 195 | 198 | 200 | 201 | 203 | 204 | 208 | 211 | 218 | 220 | 222 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 214 | 225 | 234 | 238 | 280 | 241 | 243 | 245 | 250 | 253 | 262 | 264 | 266 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 313 | 277 | 320 | 281 | 284 | 286 | 291 | 296 | 306 | 308 | 311 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 352 | 317 | 360 | 321 | 325 | 327 | 333 | 338 | 350 | 352 | 355 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 357 | 400 | 361 | 365 | 368 | 159 | 380 | 393 | 397 | 400 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 401 | 406 | 409 | 416 | 423 | 437 | 441 | 444 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 458 | 465 | 481 | 485 | 488 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 507 | 525 | 529 | 533 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 568 | 573 | 577 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 612 | 617 | 622 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 656 | 661 | 666 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 705 | 711 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX

RPF=150

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 8 | 17 | 21 | 23 | 27 | 30 | 31 | 35 | 37 | 38 | 42 | 46 | 50 | 52 | 54 | 54 | 54 | 55 | 56 | 57 | 59 | 61 | 62 | 63 | |
| 3.0 | 17 | 34 | 42 | 47 | 54 | 60 | 63 | 71 | 75 | 77 | 85 | 93 | 100 | 105 | 107 | 109 | 109 | 111 | 112 | 115 | 117 | 123 | 125 | 126 | |
| 2.5 | 20 | 45 | 60 | 70 | 81 | 90 | 95 | 106 | 112 | 116 | 128 | 140 | 150 | 158 | 161 | 163 | 164 | 167 | 168 | 173 | 176 | 185 | 187 | 189 | |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 154 | 171 | 187 | 200 | 211 | 215 | 218 | 219 | 223 | 225 | 230 | 235 | 247 | 250 | 252 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 234 | 250 | 264 | 269 | 272 | 274 | 278 | 281 | 288 | 294 | 308 | 312 | 315 | |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 317 | 323 | 327 | 329 | 334 | 337 | 346 | 353 | 370 | 375 | 379 | |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 377 | 381 | 384 | 390 | 393 | 403 | 412 | 432 | 437 | 442 | |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 461 | 471 | 494 | 500 | 505 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 530 | 556 | 562 | 568 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 617 | 625 | 631 | |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 679 | 687 | 694 | |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 758 | |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |

RPF=200

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 9 | 18 | 23 | 25 | 29 | 33 | 35 | 40 | 42 | 44 | 50 | 55 | 60 | 64 | 65 | 66 | 67 | 68 | 69 | 71 | 73 | 78 | 79 | 80 |
| 3.0 | 18 | 36 | 46 | 51 | 59 | 66 | 70 | 80 | 85 | 88 | 100 | 111 | 120 | 128 | 131 | 133 | 134 | 137 | 138 | 143 | 146 | 155 | 158 | 160 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 106 | 120 | 128 | 133 | 150 | 166 | 180 | 193 | 197 | 200 | 201 | 205 | 207 | 214 | 220 | 233 | 237 | 240 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 222 | 240 | 257 | 263 | 266 | 269 | 274 | 277 | 285 | 293 | 311 | 316 | 320 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 321 | 329 | 333 | 336 | 342 | 346 | 357 | 366 | 389 | 395 | 400 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 403 | 411 | 415 | 428 | 440 | 466 | 473 | 480 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 513 | 544 | 552 | 560 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 622 | 631 | 640 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 710 | 720 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX RPF=350

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 9 | 19 | 25 | 29 | 34 | 38 | 41 | 48 | 52 | 54 | 63 | 73 | 81 | 89 | 92 | 93 | 94 | 97 | 98 | 103 | 107 | 117 | 120 | 122 | |
| 3.0 | 18 | 39 | 51 | 58 | 68 | 77 | 83 | 97 | 105 | 109 | 127 | 146 | 161 | 177 | 183 | 187 | 189 | 197 | 197 | 206 | 214 | 234 | 239 | 244 | |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 191 | 218 | 242 | 266 | 275 | 280 | 283 | 291 | 295 | 309 | 321 | 350 | 358 | 365 | |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 355 | 367 | 373 | 378 | 388 | 394 | 412 | 428 | 467 | 477 | 487 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 535 | 584 | 597 | 609 | |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 716 | 731 | |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |

RPF=400

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 9 | 20 | 26 | 29 | 35 | 40 | 43 | 50 | 54 | 57 | 66 | 77 | 86 | 95 | 98 | 100 | 101 | 104 | 106 | 111 | 116 | 128 | 131 | 134 |
| 3.0 | 19 | 40 | 52 | 59 | 70 | 80 | 86 | 100 | 109 | 114 | 133 | 154 | 171 | 189 | 196 | 200 | 202 | 208 | 212 | 222 | 232 | 255 | 261 | 267 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 231 | 257 | 284 | 294 | 300 | 304 | 313 | 318 | 333 | 348 | 382 | 392 | 400 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 405 | 417 | 424 | 445 | 463 | 509 | 522 | 534 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 637 | 652 | 667 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

MCFSS Techniques and Procedures

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX

RPF=450

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 9 | 20 | 26 | 29 | 35 | 40 | 44 | 51 | 56 | 59 | 69 | 80 | 90 | 100 | 104 | 106 | 107 | 111 | 113 | 119 | 124 | 137 | 141 | 144 | |
| 3.0 | 19 | 40 | 52 | 60 | 71 | 81 | 88 | 103 | 112 | 118 | 138 | 161 | 180 | 200 | 208 | 212 | 215 | 221 | 225 | 237 | 248 | 274 | 282 | 288 | |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 241 | 270 | 300 | 311 | 318 | 322 | 332 | 338 | 355 | 371 | 411 | 422 | 432 | |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 474 | 495 | 548 | 563 | 576 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 685 | 704 | 720 | |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |

RPF=500

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3.5 | 9 | 20 | 26 | 30 | 36 | 41 | 45 | 53 | 57 | 60 | 71 | 83 | 94 | 105 | 109 | 111 | 113 | 116 | 119 | 125 | 131 | 146 | 151 | 154 |
| 3.0 | 19 | 41 | 53 | 61 | 72 | 83 | 90 | 106 | 115 | 121 | 143 | 167 | 187 | 209 | 218 | 222 | 225 | 233 | 237 | 250 | 262 | 292 | 301 | 308 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 281 | 314 | 326 | 333 | 338 | 349 | 355 | 375 | 393 | 438 | 451 | 462 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 524 | 584 | 601 | 616 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 770 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |

INDEX

RPF=550

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 3.5 | 9 | 20 | 27 | 31 | 36 | 42 | 45 | 54 | 59 | 62 | 73 | 86 | 97 | 109 | 113 | 116 | 118 | 122 | 124 | 131 | 138 | 155 | 159 | 164 | |
| 3.0 | 19 | 41 | 54 | 62 | 73 | 84 | 91 | 108 | 117 | 124 | 146 | 172 | 194 | 218 | 227 | 232 | 235 | 243 | 248 | 262 | 275 | 309 | 318 | 327 | |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 291 | 326 | 340 | 348 | 353 | 365 | 371 | 393 | 413 | 463 | 477 | 490 | |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 617 | 635 | 652 | |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 770 | |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 | |

RPF=600

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 3.5 | 9 | 20 | 27 | 31 | 37 | 42 | 46 | 55 | 60 | 63 | 75 | 88 | 100 | 113 | 117 | 120 | 122 | 126 | 129 | 137 | 144 | 162 | 167 | 172 |
| 3.0 | 19 | 41 | 54 | 62 | 73 | 85 | 93 | 110 | 120 | 126 | 150 | 176 | 200 | 225 | 235 | 240 | 244 | 252 | 257 | 273 | 287 | 324 | 334 | 344 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 338 | 352 | 360 | 366 | 379 | 386 | 409 | 431 | 485 | 501 | 515 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 647 | 667 | 686 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 770 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

MCFSS Techniques and Procedures

G-7

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX RPF=650

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 3.5 | 9 | 20 | 27 | 31 | 37 | 43 | 47 | 55 | 61 | 64 | 76 | 90 | 103 | 116 | 121 | 124 | 126 | 131 | 133 | 142 | 149 | 169 | 175 | 180 |
| 3.0 | 19 | 42 | 54 | 63 | 75 | 86 | 94 | 111 | 121 | 128 | 153 | 180 | 205 | 232 | 242 | 248 | 252 | 261 | 266 | 283 | 298 | 338 | 349 | 359 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 348 | 363 | 372 | 377 | 391 | 399 | 424 | 447 | 506 | 523 | 539 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 675 | 697 | 718 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 770 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

RPF=700

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 27 | 31 | 37 | 43 | 47 | 56 | 61 | 65 | 78 | 92 | 105 | 119 | 124 | 128 | 130 | 134 | 137 | 146 | 155 | 176 | 182 | 188 |
| 3.0 | 19 | 42 | 55 | 63 | 75 | 87 | 95 | 113 | 123 | 130 | 155 | 184 | 210 | 238 | 249 | 255 | 259 | 269 | 274 | 292 | 309 | 351 | 363 | 374 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 357 | 373 | 382 | 388 | 403 | 411 | 438 | 463 | 526 | 544 | 561 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 725 | 748 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX

RPF=750

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 27 | 32 | 38 | 44 | 47 | 57 | 62 | 66 | 79 | 94 | 107 | 122 | 127 | 131 | 133 | 138 | 141 | 151 | 159 | 182 | 188 | 194 |
| 3.0 | 19 | 42 | 55 | 64 | 76 | 88 | 95 | 114 | 125 | 132 | 158 | 187 | 214 | 243 | 255 | 261 | 265 | 276 | 282 | 301 | 318 | 363 | 376 | 388 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 382 | 392 | 398 | 413 | 422 | 451 | 477 | 544 | 563 | 582 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 775 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

RPF=800

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 27 | 32 | 38 | 44 | 48 | 57 | 63 | 66 | 80 | 95 | 109 | 124 | 130 | 134 | 136 | 141 | 144 | 154 | 164 | 188 | 194 | 201 |
| 3.0 | 19 | 42 | 55 | 64 | 76 | 88 | 95 | 115 | 126 | 133 | 160 | 190 | 218 | 249 | 260 | 267 | 271 | 282 | 288 | 308 | 327 | 374 | 388 | 401 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 382 | 400 | 407 | 423 | 432 | 462 | 490 | 561 | 582 | 601 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

MCFSS Techniques and Procedures

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX

RPF=850

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 28 | 32 | 38 | 44 | 48 | 58 | 63 | 67 | 81 | 97 | 111 | 127 | 133 | 136 | 139 | 144 | 148 | 158 | 168 | 193 | 200 | 207 |
| 3.0 | 19 | 42 | 56 | 64 | 77 | 89 | 97 | 116 | 127 | 134 | 162 | 193 | 222 | 253 | 265 | 272 | 277 | 288 | 295 | 315 | 335 | 385 | 399 | 413 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 432 | 442 | 473 | 502 | 577 | 599 | 619 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

RPF=900

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 28 | 32 | 38 | 45 | 49 | 58 | 64 | 68 | 82 | 98 | 113 | 129 | 135 | 139 | 141 | 147 | 151 | 161 | 171 | 198 | 206 | 213 |
| 3.0 | 19 | 42 | 56 | 64 | 77 | 90 | 98 | 117 | 128 | 136 | 163 | 196 | 225 | 257 | 270 | 277 | 282 | 294 | 301 | 322 | 342 | 395 | 410 | 425 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 483 | 513 | 592 | 615 | 636 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RV1 | 10 | 10 | 10 | 35 | 35 | 50 | 10 | 35 | 50 | 10 | 50 | 100 | 150 | 10 | 35 | 50 | 10 | 35 | 50 | 100 | 150 | 350 | 350 | 400 | |
| RV2 | 10 | 35 | 50 | 35 | 50 | 50 | 100 | 100 | 100 | 150 | 150 | 150 | 150 | 350 | 350 | 350 | 400 | 400 | 400 | 400 | 400 | 400 | 350 | 400 | 400 |

INDEX RPF=950

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 28 | 32 | 39 | 45 | 49 | 59 | 64 | 68 | 82 | 99 | 114 | 131 | 137 | 141 | 144 | 150 | 153 | 164 | 175 | 203 | 211 | 218 |
| 3.0 | 19 | 42 | 56 | 65 | 78 | 90 | 98 | 118 | 129 | 137 | 165 | 198 | 228 | 261 | 274 | 282 | 287 | 299 | 306 | 328 | 349 | 404 | 420 | 435 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 492 | 523 | 606 | 630 | 653 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

RPF=999

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3.5 | 9 | 21 | 28 | 32 | 39 | 45 | 49 | 59 | 65 | 69 | 83 | 100 | 116 | 133 | 139 | 143 | 146 | 152 | 156 | 167 | 178 | 207 | 215 | 223 |
| 3.0 | 19 | 42 | 56 | 65 | 78 | 90 | 99 | 119 | 130 | 138 | 166 | 200 | 231 | 265 | 278 | 286 | 291 | 304 | 311 | 334 | 355 | 413 | 430 | 445 |
| 2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 533 | 618 | 644 | 668 |
| 2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| 0.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -0.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -1.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -2.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -3.5 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |
| -4.0 | 20 | 45 | 60 | 70 | 85 | 100 | 110 | 135 | 150 | 160 | 200 | 250 | 300 | 360 | 385 | 400 | 410 | 435 | 450 | 500 | 550 | 700 | 750 | 800 |

Appendix H

Sample MCFSS SOP



UNITED STATES MARINE CORPS
6TH MARINE DIVISION (REIN)
QUANTICO, VIRGINIA 22134-5021

DivO P3120.1
G-3
8 Aug 1994

DIVISION ORDER P3120.1

From: Commanding General
To: Distribution List

Subj: MARINE CORPS FIRE SUPPORT SYSTEM STANDARD
OPERATING PROCEDURE (MCFSS SOP)

- Ref:
- (a) FMFM 6-9, Marine Artillery Support
 - (b) FMFM 6-18, Techniques and Procedures for Fire Support Coordination
 - (c) FMFM 6-18-1, MCFSS Techniques and Procedures
 - (d) FMFM 6-23/TC 6-40A, Field Artillery Automated Cannon Gunnery
 - (e) ST 6-1-1, Lightweight Tactical Fire Direction System (LTACFIRE) Operations
 - (f) ST 6-40-30, Battery Computer System Job Aids
 - (g) TM 11-7440-283-12-1-1&2, Cannon Battery Computer System
 - (h) TM 11-5840-354-10, Operators Manual for Radar Sets AN/TPQ-36(V)3
 - (i) TM 08625A-10/1-1&2, Meteorological Data System AN/TMQ-31

Encl: (1) Locator Sheet

1. Purpose. To implement standard procedures and techniques in the use of automated fire direction and fire support coordination within the 6th Marine Division.
2. Cancellation. None.
3. General. Standard entries are required to allow the digital fire support systems to communicate and to avoid confusion during the processing of information. This standardization requires a much greater degree of precision than most voice/manual operations. The basis for this SOP is FMFM 6-18-1. Strict adherence to the procedures established in FMFM 6-18-1 and this SOP are paramount to our success in the digital arena. Commanding officers and staff section officers-in-charge will use this SOP as a basis for the operation of their digital devices.
4. Action. This SOP is effective upon receipt. Commanding officers and staff section officers-in-charge will use this SOP as a basis for the operation of their digital devices. This SOP will be present and readily available at all centers using automated/digital devices in the 15th Marines.
5. Certification. Reviewed and approved this date.

J. A. LEJEUNE

Distribution: A

DivO P3120.1
8 Aug 1994

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CHAPTER 1

OVERVIEW OF MCFSS

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MCFSS SOP**CHAPTER 1****OVERVIEW OF MCFSS**

1000. **THE MARINE CORPS FIRE SUPPORT SYSTEM.** The Marine Corps Fire Support System (MCFSS) provides an automated means for the conduct of fire support operations by linking most fire support agencies digitally. The fully implemented MCFSS is composed of the following equipment:

1. **LCU.** The AN/GYK-37(V1) Lightweight Computer Unit (LCU), loaded with Initial Fire Support Automated System (IFSAS) software, is located at all FSCCs, the MEF FFCC, and the DASC in a single terminal command post configuration.
2. **BCT.** The AN/GYG-1(V) Battlefield Computer Terminal (BCT) with software similar to the IFSAS LCU load is located at all FDCs in a dual terminal command post configuration.
3. **BCS.** The AN/GYK-37(V) Battery Computer System (BCS) is located at the battery FDC. This system will be replaced by the LCU loaded with BCS software.
4. **DMS.** The AN/PSC-2A Digital Message System (DMS) is provided to all forward observer teams and foot-mobile battalion FSCCs.
5. **MDS.** The AN/TMQ-31 Meteorological Data System (MDS) is located at the artillery regiment's meteorological section. The system will be replaced by the Meteorological Measuring System (MMS).
6. **Firefinder Radar.** The AN/TPQ-36 Firefinder Radar is located at the artillery regiment's target acquisition platoon.
7. **U.S. Army Systems.** MCFSS devices will communicate and operate with all field Army TACFIRE and IFSAS equipment.

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1001. SCOPE OF THIS DOCUMENT. MCFSS requires detailed planning and adherence to procedures for success. This SOP is based on FMFM 6-18-1. This SOP describes the detailed procedures to be used by all stations in MCFSS for the 6th Marine Division. Procedures set forth in this SOP are effective immediately. These procedures may be altered by appropriate sections to operations orders.

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CHAPTER 2

COMMUNICATIONS

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MCFSS SOP**CHAPTER 2****COMMUNICATIONS**

2000. PROCEDURE. The digital procedures used in the 6th Marine Division will comply with those established in reference (c) to this SOP. These procedures will only be modified when directed by this SOP and/or appropriate sections of operations orders.

2001. COMMUNICATIONS PARAMETERS

1. Nets. Data communications nets will be configured as per chapter 1 of reference (c). Standard net settings and parameters for digital communications will be provided in Enclosure 2 (Data Guard Chart) to Tab J (MCFSS Plan) of Appendix 12 (Fire Support) of Annex C (Operations) of operations orders.

2. Subscribers. Each net control station is responsible for providing the digital subscriber table for its net(s). The system of standard logical names, addressing, and subscriber identification is published in chapter 2 of reference (c). This data is published in Enclosure 3 (Subscriber Table) to Tab J (MCFSS Plan) of Appendix 12 (Fire Support) of Annex C (Operations) of operations orders.

3. Message of Interest. Message of interest (MOI) processing among LCU and BCT stations is the crux of information transfer required to operate MCFSS. The MOI setup established in chapter 2 of reference (c) will be used. Additional modifications are directed in paragraph 12 of Tab J (MCFSS Plan) of Appendix 12 (Fire Support) of Annex C (Operations) of the operations order. In addition, using stations may establish additional MOI messages that do not alter the required data flow as directed in reference (c).

4. PCLD Changes. The priority, classification, logging, and display (PCLD) changes published in chapter 2 of reference (c) apply. Stations may make additional changes. However, caution must be exercised. Changing the display default for executable messages to **NO** causes that message to automatically process.

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5. Legal Messages. When a subscriber is established, all stations will assign default legal messages to that subscriber. To ensure messages are not received in the alert queue, all messages will be made legal for each BCT and LCU equipped subscriber.
6. Default Subscriber. Default subscriber assignments in paragraph 2006 of reference (c) will be used and will not be altered unless directed by operations orders.
7. Multisubscriber Groups. Required multisubscriber groups will be entered as directed in Enclosure 3 (Subscriber Table) to Tab J (MCFSS Plan) of Appendix 12 (Fire Support) of Annex C (Operations) of the operations order. Stations may enter and use additional multisubscriber groups as required.
8. Changes to Established Communications Criteria. During the course of operations, communications requirements may dictate changes to the communications parameters and subscriber data. Changes are requested through the net control station for that net and must be directed by that station. Fixed format relay addresses will only be assigned by the NCS.

2002. COMMUNICATIONS ETIQUETTE

1. Entering the Net. Stations entering the net will establish voice communications on the appropriate communications coordination net using the radio/communications equipment assigned for the data net. (Bn FD Net voice for FOs, battery FDCs, and battalion FSCCs entering COF nets.) When satisfactory voice communications are established, the net control station directs the station to enter the data net and to send a digital communications check. The subscriber station changes frequencies from the communications coordination net to the data net and transmits communications checks digitally.
2. Troubleshooting. Communications troubleshooting will be directed by the net control station on the appropriate communications coordination (Bn FD Net for stations on the COF nets.)

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3. Loss of Digital Communications. If a station loses digital communications and is unable to reestablish communications, that station will continue operations on an appropriate voice net.

a. Procedure. The following procedures apply:

- (1) Troubleshoot all software settings.
- (2) Troubleshoot hardware including radio and antennas, checking with "BIRD" if possible.
- (3) Establish voice communications on the appropriate net (see Table 2-1).
- (4) Continue to use the digital computers to process information, making entries from the keyboard, if possible.
- (5) Continue to troubleshoot the data net.

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Table 2-1

| LOSS OF DIGITAL COMM ON: | ESTABLISH VOICE COMM ON: | REMARKS |
|--------------------------|-------------------------------|--|
| MEF FFC Net (D) | MEF FFC Net (V) | |
| Div FSC Net (D) | Div FSC Net (V) | |
| Regt FSC Net (D) | Supporting Arty Bn FD1 Net(V) | |
| Regt FD2 Net(D) | Regt FD1 Net(V) | |
| Bn FD2 Net(D) | Reinforced Arty Bn FD1 Net(V) | |
| COF Net (D) | Supporting Arty Bn FD1 Net(V) | If a number of stations are forced to communicate on the Bn FD1 Net(V), one of the data COF nets will be operated as a voice net and FOs, battery FDCs, and battalion FSCCs requiring voice communications are directed to that net. |

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CHAPTER 3

COMMANDER'S MODIFICATION FILES

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CHAPTER 3

COMMANDER'S MODIFICATION FILES

3000. GENERAL. The BCT/LCU allows the input of three commander's modification files.

1. The fire mission modification file provides the computer with parameters used in target analysis. These entries result in the computers determination of volume of fire and fire unit selection.
2. The fire plan modification file provides tactical fire control solution guidance to be used for a fire plan in the same manner as the fire mission modification file is used for fire mission processing.
3. Entries in the Artillery Target Intelligence (ATI) modification file form the basis for targeting solutions and generation of fire missions on high payoff targets.

3001. CURRENT PLAN COMMANDER'S MODIFICATION FILE

1. FM;MOD. Table 3-1 provides SOP entries for the FM;MOD message.

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Table 3-1

| | | | |
|----------------|--|-------------------------------------|---|
| IGAMMO: | NO | SADARM CRITERIA | |
| MLRSIZ: | 250 | MNFLOT | 1,500 |
| ECOF: | 05 (0.5%) | VOLLEYS/AP | 2 |
| AUTOFF: | NO | MAXRV | 100 |
| PZONE: | Zone of the Main Effort of the Supported Unit. | TARGET SEGMENTATION CRITERIA | |
| | | Threshold Radius | 250 (Battalion FDC) 500 (Regimental FDC) |
| | | Maximum Segments | 3 (Battalion FDC) 5 (Regimental FDC) |
| PTYPE: | ARTY/UNKNOWN | Minimum Segments | 2 |
| PSHELL: | HEF | Delta Time | 4 Minutes |

2. FM;FUSEL

a. Fire Unit Ordering. Table 3-2 provides the required fire unit ordering. Order values may be modified at FDCs as required; however, all stations will comply with the ordering of units as listed.

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Table 3-2

| STATION | FU ORDERING |
|--------------------|---|
| MEF FFCC | None required. |
| Division FSCC | None required. |
| DASC | None required. |
| Regimental FSCC | All artillery units ordered under the DS artillery battalion name. All 81mm mortar platoon ordered with a higher number (lower precedence) than artillery, under the battalion FSCC name. |
| Battalion FSCC | All artillery units ordered under the DS artillery battalion name. The 81mm mortar platoon ordered with a higher number (lower precedence) than artillery, under the battalion FSCC name. |
| Regimental FDC | All artillery units ordered under their parent battalion name. Ordering values are established to cause GS, GSR, R, and finally DS units to be chosen for firing. |
| Regimental TPC | None required. |
| Battalion FDC | Batteries of the DS battalion ordered under the battalion name. Batteries of the R battalion ordered with a higher number (lower precedence) than DS artillery, under the R battalion name. |

b. Maximum Volleys. Table 3-3 provides the maximum volleys entry for use at all stations.

Table 3-3

| STATION | MAX VOLLEYS |
|----------------|-------------|
| 81mm Mortar | 6 |
| 105mm Howitzer | 4 |
| 155mm Howitzer | 3 |
| All Naval Guns | 6 |

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3. **FM:XCLUDE.** Table 3-4 provides exclusions required for operations. Additional exclusions are added as required.

Table 3-4

| STATION | EXCLUSION |
|-----------------|---|
| MEF FFCC | All weapon types. |
| Division FSCC | All weapon types. |
| DASC | All weapon types. |
| Regimental FSCC | None. |
| Battalion FSCC | None. |
| Regimental FDC | No artillery fire units. |
| Regimental TPC | All weapon types. |
| Battalion FDC | All fire units not organic to the battalion or the reinforcing battalion. |

4. **FM:ATTACK.** Attack criteria is situation-dependent. However, table 3-5 provides a point of departure to be modified by operations orders as required.

Table 3-5

| Target | Volleys | Effects | Target | Volleys | Effects |
|------------|---------|---------|--------------|---------|---------|
| ADA | | | ARMOR | | |
| Unknown | 1 | | Unknown | 1 | |
| Light | | 5% | Light | | 4% |
| Medium | | 5% | Medium | | 3% |
| Heavy | | 5% | Heavy | 3 | |
| Missile | | 5% | APC | | 5% |
| Position | 1 | | Position | 2 | |

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Table 3-5 (continued)

| Target | Volleys | Effects | Target | Volleys | Effects |
|-----------------|---------|---------|-----------------|---------|---------|
| ARTY | | | ASSY | | |
| Unknown | 1 | | Unknown | 1 | |
| Light | | 5% | Troop | | 7% |
| Medium | | 5% | TRPVEH | | 5% |
| Heavy | | 5% | TRPMEC | | 3% |
| Position | 2 | | TRPARM | | 3% |
| BLDG | | | TACBTR | | |
| Unknown | 1 | | ADMBTR | | 4% |
| Wood | 1 | | TACBMP | | 3% |
| Concrete | 2 | | ADMBMP | | 4% |
| Masonry | 2 | | TNKBNT | 3 | |
| Metal | 1 | | TNKBNA | 3 | |
| Special Purpose | 1 | | SPRTEL | | 3% |
| FORM | | | BRIDGE | | |
| AGBBTR | | 3% | Wood | 1 | |
| AGBBMP | | 3% | Concrete | 2 | |
| AGBTKR | 3 | | Steel | 2 | |
| MRBMNR | | 4% | Foot Pontoon | 1 | |
| MRBMNP | | 4% | Vehicle Pontoon | 1 | |
| TNKBNM | 3 | | Site | 1 | |
| MRBSPR | | 5% | Raft | 1 | |
| TNKBNS | 2 | | Ferry | 1 | |

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Table 3-5 (continued)

| Target | Volleys | Effects | Target | Volleys | Effects |
|---------------|---------|---------|------------------|---------|---------|
| CEN | | | EQUIP | | |
| Unknown | | 10% | Unknown | 1 | |
| Small | | 10% | Radar | 1 | |
| Battalion | | 10% | Guidance | 1 | |
| Regiment | | 7% | EW | 1 | |
| Division | | 5% | Loudspeaker | 1 | |
| Forward | | 10% | Search Light | 1 | |
| MORT | | | PERS | | |
| Unknown | 1 | | All Types Prand | | 10% |
| Position | 1 | | All Types Prone | | 10% |
| Light | 1 | | All Types Prug | | 7% |
| Medium | | 8% | All Types Dugin | 2 | |
| Heavy | 2 | | All Types Cover | 2 | |
| Very Heavy | 2 | | All Types Prover | 2 | |
| RKTMSL | | | SUPPLY | | |
| All Types | | 10% | All Types | 1 | |
| TERR | | | VEH | | |
| All Types | 1 | | All Types | | 10% |
| WPN | | | | | |
| All Types | 1 | | | | |

Subordinate commands may alter the commander's attack method to fit their missions. However, target types will be maintained as volleys or effects targets as issued by the division FSCC.

5. **FM;CENTER.** FM;CENTER files are automatically created when the fire unit ordering dictated in paragraph 3001.2b is entered.

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3002. **FIRE PLAN COMMANDER'S MODIFICATION FILE**. Fire plan commander's modification files are created by copying from the current modification file and making necessary changes.

3003. **ARTILLERY TARGET INTELLIGENCE MODIFICATION FILE**. ATI file entries are dependent upon the tactical situation, high payoff target list, and target acquisition agencies available, to name a few. As such, no standard entries are established, but will be published in the Tab J (MCFSS Plan) of Appendix 12 (Fire Support) of operations orders.

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CHAPTER 4

SUPPORT FILES

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| On-Call Fire Support Coordination Measures and Boundaries | 4002 | 4-3 |

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CHAPTER 4

SUPPORT FILES

4000. NAMING OF FIRE SUPPORT COORDINATION MEASURES AND BOUNDARIES. All support geometry will be named in accordance with Appendix A of reference (c).

4001. MANAGEMENT OF GEOMETRY

1. **FLOT Management.** Regimental FLOTs will be established within the 6th Marine Division. Each regimental FSCC assigns FLOT point numbers from the regimental FLOT to each of the battalion FSCCs. Each observer whose supported company is in contact is assigned two numbered FLOT points by the battalion FSCC from its allocated numbers.

a. **Reporting.** The observer reports his two points when stationary and every 15 minutes when moving. The battalion FSCC is responsible for ensuring that the received points are numbered in ascending order from left to right as facing the enemy.

b. **Updating.** Updating points is accomplished by transmitting the assigned points with new grids.

2. **CFL Management.** The CFL is maintained at the division FSCC and updated by the division FSCC based on advances in the FLOT.

3. **Phase Lines.** Phase lines are established by the division FSCC to assist in movement control. Up to four phase lines may be entered as CFLs named as phase lines.

4002. ON-CALL FIRE SUPPORT COORDINATION MEASURES AND BOUNDARIES. On-call (future) fire support coordination measures and boundaries are entered in **PLAN:ONCALL** and disseminated to lower echelons by manual transmission. The responsible FSCC will cause the measure to be activated by entering and transmitting a **SPRT;BUILD** message with option **BUILD CURRENT FROM EXISTING; _____** [measure's name].

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CHAPTER 5

AMMUNITION AND FIRE UNIT FILES

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| Fire Unit Updates (AFU;UPDATES) | 5001 | 5-3 |

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CHAPTER 5

AMMUNITION AND FIRE UNIT FILES

5000. GENERAL. All stations in MCFSS handle ammunition and artillery fire unit (AFU) files. This chapter provides specific guidance for generating and checking AFU files.

5001. FIRE UNIT UPDATES. Fire Unit Updates (AFU;UPDATES) will be entered by the following units:

1. Battery FDCs. Battery FDCs enter AFU;UPDATES at the BCS and transmit them to the battalion FDC where they are stored and disseminated by MOI processing. Only one AFU;UPDATE is transmitted per battery. The second BCS will not transmit an additional AFU;UPDATE.

2. Battalion FSCC. The battalion FSCC will enter the 81mm mortar platoon. The 81s must be entered using M29A1 as the weapon since M252 is not available. Enter the correct max ranges. The computer will output an alert indicating that these ranges are excessive but still accepts the data.

3. Naval Surface Fire Support. All naval surface fire support units are entered by the units that they support. Each gun caliber is entered as a separate AFU;UPDATE if the ship possesses mixed armament.

4. Specific Entries. The following specific entries will be made:

a. APL:____ [all types]

b. RT:0

c. Battery FDCs enter the maximum elevation achieved by the gun with the lowest maximum QE as MAXEL:_____.

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CHAPTER 6

FIRE MISSION PROCEDURES

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| Procedures for FASCAM, Illumination, Copperhead, and Fire for Effect Missions | 6002 | 6-9 |

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CHAPTER 6

FIRE MISSION PROCEDURES

6000. **METHOD.** The standard method of fire mission processing in the 6th Marine Division is the FSCC Approval Mode. This mode is described in paragraph 4002 of reference (c). Specific procedures are described here.

6001. **PROCESSING OF AREA FIRE MISSIONS**

1. **Equipment Setup.** The following provides required setup entries to process missions in the FSCC Approval Mode of operations.

a. **Forward Observer's DMS Setup.** The FO DMS is initialized with the following entries:

(1) **FIST:YES**

(2) **DFLT DEST:_____ [Battalion FSCC]**

b. **Battalion FSCC Setup.** The battalion FSCC establishes LCU setup as per chapters 1 and 2 of reference (c). Entries of particular importance are —

(1) **PCLD** entered with **FM;CFF** and **FM;SUBS** as **DISPLAY;YES**.

(2) **FM;FUSEL** entries as stated in chapter 3 of this SOP.

(3) **FM;ATTACK** criteria in accordance with the battalion commander's operations order guidance.

c. **Battalion FDC Setup.** The battalion FDC establishes BCT setup per chapters 1 and 2 of reference (c). Entries of particular importance are —

(1) **FM;FUSEL** entries as stated in chapter 3 of this SOP.

(2) **FM;ATTACK** criteria in accordance with the battalion commander's operations order guidance.

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d. Battery FDC Setup. Enter the battalion FDC's logical name in the RPTAMMO field of the SYS;SETUP message.

2. Area Fire Missions. Area fire missions received from observers are processed as described in table 6-1.

Table 6-1

| Step | Agency | Message | Remarks |
|------|--------------------------|---------|--|
| 1 | FO/ DMS | FR | FO transmits digital call for fire to battalion FSCC. Ensures that DOP is only entered if TYPE is PERSONNEL or target will be processed at BCT/LCU as PERS/UNK with transmitted DOP. |
| 2 | Battalion FSCC LCU | FM;CFF | FO's FR is received as FM;CFF. Received message is queued in the priority queue. Battalion FSCC operator — <ul style="list-style-type: none"> • Displays the message. • Determines if mission is request for illumination, FASCAM, Copperhead, or FPF. • Records mission on fire mission log. • Plots mission and attempts to clear or coordinate. • Goes to the appropriate table if any of the following occurs: <ol style="list-style-type: none"> a. If mission is denied, goes to table 4-2. b. If mission requires coordination across boundary, goes to table 4-3. c. If mission is request for illumination, FASCAM, Copperhead, or FPF, goes to paragraph 6002. • Otherwise, ACTION, ENTERS the FM;CFF. |
| 3 | Battalion FSCC | FM;CFF | Fire mission solution is placed in the priority queue and also appears in the fire mission file. Displays fire mission chain from priority queue and records target number. Transmits FM;CFF addressed to battalion FDC. |

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Table 6-1 (continued)

| Step | Agency | Message | Remarks |
|------|-------------------------------|-----------|---|
| 4 | Battalion FDC | FM;CFF | <p>FM;CFF is received in priority queue. Mission is known to be cleared since battalion FSCC transmitted message. Battalion FDC —</p> <ul style="list-style-type: none"> • Records the mission. • Plots the mission and determines and enters altitude on FM;CFF. • Processes mission. Transmits FM;MTO and FM;CFF:Os. |
| 5A | Battalion FSCC | FM;MTO | <p>FM;MTO is received and automatically retransmitted to FO. FM;MTO prints on printer. Records passing of FM;MTO on fire mission log.</p> |
| 5B | Battery FDC | FM;CFF:O | <p>Battery FDC plots target location and determines appropriate lot and charge to ensure required accuracy for mission. FM;CFF:O is executed and fire commands transmitted to guns' GDUs.</p> |
| 5C | FO | MTO | <p>FO examines MTO. MTO is automatically associated with mission based on mission buffer number.</p> |
| 5D | Battery FDC | FM;MTO | <p>Battery FDC displays blank FM;MTO, enters target number, probable error in range, and time of flight, and transmits to battalion FDC. Battalion FDC retransmits to FO automatically.</p> |
| 6 | Battery FDC | FM; FOCMD | <p>If mission is AMC, transmits FM;FOCMD:READY to FO. Transmits FM;FOCMD:SHOT when appropriate. Transmits FM;FOCMD:SPLASH only if firing high angle, firing for an AO or UAV FO, or if requested. Transmits FM;FOCMD:RDCOMP if appropriate.</p> |
| 7 | Battalion FDC, Battalion FSCC | FM; FOCMD | <p>These messages print at BCT/LCU but are automatically retransmitted as long as PCLD default of DISPLAY:NO is not altered in FM;FOCMD.</p> |

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Table 6-1 (continued)

| Step | Agency | Message | Remarks |
|------|----------------|--------------------|---|
| 8 | FO | FM;FOCMD | If mission was AMC, transmits FIRE at appropriate time. This command passes <u>automatically</u> through all devices to GDUs. |
| 9 | FO | SUBS ADJ | FO transmits SUBS ADJ to battalion FSCC. |
| 10 | Battalion FSCC | FM;SUBS | Battalion FSCC ACTION, ENTERS FM;SUBS and transmits FM;SUBS to battalion FDC. |
| 11 | Battalion FDC | FM;SUBS | Battalion FDC processes FM;SUBS in same fashion as FM;CFF , repeating steps 4-5 above except no new MTO is transmitted. |
| 12 | FO | EOM & SURV | FO completes mission. Requests EOM or EOMRAT using EOM & SURV message. Enters DISPOSITION and CASUALTIES . |
| 13 | Battalion FSCC | FM;SUBS EOM:YES | Mission is ended and FM;SUBS is generated to transmit to battalion FDC. If FO selected EOMRAT , adjusted location is stored as KNPT at battalion FSCC. |
| 14 | Battalion FDC | FM;SUBS EOM:YES | Mission is ended and FM;SUBS is generated for battery FDCs. An AFU;MFR is generated to report mission to target pool at division FSCC. Transmits FM;SUBS and enters AFU;MFR . |
| 15 | Battery FDC | FM;SUBS | Battery FDC executes FM;SUBS to end mission. BCS automatically generates AFU;AMMO:E to update battalion FDC's ammunition count. |
| 16 | Battalion FDC | AFU; AMMO:E | Enters AFU;AMMO:E to update ammunition count and MOI the message. |

3. Denial of Missions. Table 6-2 describes the steps used at either the battalion FSCC or battalion FDC to deny a fire mission. This procedure discusses ending the mission when it is received. However, a fire mission may be denied by transmitting a new **FM;MTO** with **UNITS:0, VOL:0** at any time.

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Table 6-2

| Step | Agency | Message | Remarks |
|------|-----------------------------|----------|--|
| 1 | Battalion FSCC or FDC | FM;CFF | Decision is made to deny fire mission. |
| 2 | Battalion FSCC or FDC | FM;CFF | Discards fire mission chain, except FM;MTO , from priority queue. Mission remains active in fire mission file. |
| 3 | Battalion FSCC or FDC | FM;MTO | Enters UNITS:0 and VOL:0 to indicate mission is denied and transmits to FO. |
| 4 | FO | FM;MTO | Displays MTO . Note UNITS:0 and VOL:0 . Composes and transmits EOM & SURV message with EOM to clear battalion FSCC and FDC mission files. |
| 5A | Battalion FSCC | FM;SUBS | Mission ends; transmits FM;SUBS that is generated in priority queue to battalion FDC. |
| 5B | Battalion FDC | FM;SUBS | Battalion FDC processes EOM and discards AFU;MFR that is generated. |
| 6 | FO | ATI GRID | If target is likely to remain in place for at least two hours, transmits an ATI report of the target to battalion FSCC. |

4. Missions Requiring Coordination Across Unit Boundaries.

Cross-boundary clearance will be requested when fires plot within 300 meters of a boundary and are known to be behind the adjacent unit's CFL or when the adjacent unit's CFL is not certainly known. Table 6-3 describes the process for requesting cross-boundary clearance.

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Table 6-3

| Step | Agency | Message | Remarks |
|------|-----------------------|---------|---|
| 1 | Battalion FSCC or FDC | FM;CFF | Plots target and determines clearance with adjacent unit is required. Battalion FSCC ACTION, ENTERS FM;CFF and determines solution addressed to supporting battalion FDC. Battalion FSCC enters REQ CLR in PTM field and readdresses and transmits FM;CFF to regimental FSCC. |
| 2 | Regimental FSCC | FM;CFF | Regimental FSCC receives FM;CFF . Since fire missions are forwarded only if clearance is required, PTM:REQ CLR prompts regimental FSCC to seek clearance. Target is plotted and FM;CFF is ACTION, ENTERED . Solution is addressed to battalion FDC. Regimental FSCC readdresses FM;CFF and transmits to unit from which clearance is required, or if mission is denied, completes SYS;PTM:___ [target number] DENIED and transmits it to requesting FSCC. |
| 3 | Affected FSCC | FM;CFF | Affected FSCC clears mission or continues to pass FM;CFF to affected subordinate FSCC that can clear mission. |
| 4 | Affected FSCC | SYS;PTM | Clearance or denial is transmitted back through chain of requestors via SYS;PTM: [target number] DENIED or CLRD . PTM is passed, and target is deleted from FM file. |
| 5 | Battalion FSCC | SYS;PTM | If mission is denied, table 6-2 beginning at step 1 applies. If mission is cleared, generates new copy of FM;CFF using FM;COMD message with option EDIT FM FILE ; and then displays FM;CFF from priority queue, addresses it, and transmits it to battalion FDC. |

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6002. PROCEDURES FOR FASCAM, ILLUMINATION, COPPERHEAD, AND FPF MISSIONS. FASCAM, illumination, Copperhead, and FPF missions will not process through a **FM;CENTER** file. Therefore, these missions must be transmitted to the battalion FDC. The battalion FDC will request clearance via **SYS;PTM** from the appropriate battalion FSCC.

1. General Procedures. Table 6-4 describes the steps necessary to coordinate and pass these missions from the FO through the battalion FSCC to the FDCs.

Table 6-4

| Step | Agency | Message | Remarks |
|------|----------------|----------------|--|
| 1 | FO | FR | FO composes FR requesting FASCAM, ILLUM, CPHD or FPF . |
| 2 | Battalion FDC | FM;CFF | Battalion FDC receives FM;CFF and determines mission is type that will not process through FM;CENTER file. Battalion FDC performs the following: <ul style="list-style-type: none"> • Enters the displayed FM;CFF. • Plots target and determines if target must be denied or requires coordination. If mission is denied, completes SYS;PTM with [target number] DENIED and transmits to requesting FDC; or transmits SYS;PTM to battalion FSCC in whose zone target plots. The latter SYS;PTM will include target number, munitions mnemonics, and six place grid with REQ CLR. |
| 3 | Battalion FSCC | SYS;PTM | Battalion FSCC determines that mission requires clearance (PTM:REQ CLR), plots the mission, and transmits SYS;PTM back to battalion FDC with CLRD or DENIED in place of REQ CLR . |
| 4 | Battalion FDC | FM;SUBS | On receiving EOM , battalion FDC transmits copy of AFU;MFR for mission by selecting ACTION, XMIT , then ACTION, ENTER to notify battalion FSCC that this mission has ended. |

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2. Illumination Procedures. All illuminations missions will be established as **ILLUM ONLY** by the observer. If coordinated illumination is required, the HE mission will be established as a separate mission. The observer will request the times of flight for both missions and control the firing by using method of control "At My Command."

3. Copperhead Procedures. If preplanned, Copperhead missions will be transmitted directly to the battery FDC after coordination with the battalion FDC. Copperhead target-of-opportunity missions follow the same sequence of events as described in table 6-4. The designate command is transmitted from the battalion FDC directly to the FO at the appropriate time.

4. FPF Procedures. All requests for FPFs will be transmitted via **SYS;PTM** to the battalion FSCC. The battalion FSCC will approve or disapprove and transmit approved requests to the battalion FDC. When ready, the battalion FDC will alert the FO to transmit the fire request. The fire request will contain the following information:

- a. Target location.
- b. Control (use **EOM** for unadjusted FPFs or adjust fire).
- c. Target size rectangular.

(1) Length — not greater than an effective sheaf front. This distance is equal to the number of pieces firing multiplied by the munitions burst width (i.e., 50m for a 155mm shell or 30m for a 105mm shell).

(2) Width — use **50**, the smallest entry available at the DMS.

(3) Attitude — enter the attitude of the long axis of the target.

(4) Priority — select **ASSIGN FPF**.

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CHAPTER 7

ARTILLERY TARGET INTELLIGENCE OPERATIONS

| | Paragraph | Page |
|---|------------------|-------------|
| Purpose | 7000 | 7-3 |
| Artillery Target Intelligence Modes | 7001 | 7-3 |
| Artillery Target Intelligence Modification File Criteria | 7002 | 7-3 |
| Maintenance of the Target File | 7003 | 7-4 |

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MCFSS SOP**CHAPTER 7****ARTILLERY TARGET INTELLIGENCE OPERATIONS**

7000. **PURPOSE.** The artillery target intelligence function of MCFSS is used to report targets and target indicators to the central target pool. This target pool takes the form of the target file maintained by the GCE FSCC. Here, duplications are resolved and fire missions are generated to attack high payoff targets. This target file's purpose is to provide an up-to-date data base as the source of fire plan targets for all stations.

7001. ARTILLERY TARGET INTELLIGENCE MODES

1. **General.** The BCT/LCU is operated in one of three **ATI** modes dependent upon the function of each station. Compliance with this paragraph is required to provide transfer of **ATI** data through the system.

2. **Artillery Target Intelligence Mode 1 Stations.** The following stations will operate in **ATI MODE 1**:

- Battalion FSCCs
- Regimental FSCCs
- DASC
- MEF FFCC

3. **Artillery Target Intelligence Mode 2 Stations.** The battalion FDCs operate in **ATI MODE 2** with the regimental FDC as the default subscriber.

4. **Artillery Target Intelligence Mode 3 Stations.** The following stations operate in **ATI MODE 3**:

- Division FSCC (or the senior GCE FSCC in smaller operations)
- TPC
- Regimental FSCCs

7002. **ARTILLERY TARGET INTELLIGENCE MODIFICATION FILE CRITERIA.** The criteria used in the **ATI** modification file is situation- and mission-dependent. These are published in operations orders. The division

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FSCC and TPC will enter the same criteria, except in the **ATI;FMMOD** the TPC will generate fire missions on solution reports only. The division FSCC updates the criteria and transmits the updates to the TPC in the form of the appropriate **ATI** modification file message; e.g., **ATI;SVMOD**, **ATI;FMMOD**, etc.

7003. MAINTENANCE OF THE TARGET FILE. All stations that store targets are responsible for managing the target file in accordance with published directions provided in operations orders. The following additional directions apply.

1. Maintenance of the Target List. Two stations specifically store targets and resolve duplications in the target lists through combination. These two stations are the TPC and the division FSCC.

a. TPC. The TPC stores targets to provide a target file for counterfire operations conducted at the regimental FDC. The TPC stores those targets that are received from radars under its control. These target reports are received and stored in the form of **ATI;CDRs**. In addition, the TPC receives counterfire targets via **ATI;SRIs** established at the division FSCC by the TPC and regimental FDC. See paragraph 2006 of reference (c) for a list of the required SRIs.

b. Division FSCC. The division FSCC receives all targets and target reports transmitted by any station in the division. These **ATI** reports are passed through the system from their point of origin to the division FSCC via MOI processing or default subscriber retransmission. The targets automatically store, and duplications are resolved through combination as governed by the **ATI;SVMOD** message. The division FSCC is responsible for deleting targets periodically as the situation dictates.

2. Nomination of Targets to the Target List. All stations submit their nominations to the target list in the form of **ATI;CDRs**. These are transmitted into the system differently depending upon the station:

a. FOs complete the message and transmit to the battalion FSCCs.

b. Battalion FSCCs enter **ATI;CDRs**, and the messages are transmitted to the regimental FSCC via MOI processing.

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- c. Regimental FSCCs enter **ATI;CDRs**, and the messages are transmitted to the division FSCC via MOI processing.
 - d. Battery FDCs transmit **ATI;CDRs** to the battalion FDC.
 - e. Battalion FDCs enter **ATI;CDRs** which are automatically transmitted to the regimental FDC via default subscriber processing.
 - f. Regimental FDCs enter **ATI;CDRs** which are automatically transmitted to the regimental FDC via MOI processing
3. Resolution of Duplication Targets. Target duplication is resolved automatically at the division FSCC. This resolution is controlled by entries made in the **ATI;SVMOD** message. The entries are dictated by the MCFSS Plan Tab of operations orders.
4. Dissemination of the Target List. The division FSCC maintains the updated target file but does not disseminate the target list. Instead, regimental FSCCs will search the division FSCC's target file continuously by establishing SRIs at the division FSCC for all targets in their zone. Battalion FSCCs and battalion FDCs will —
- a. Delete from the computer all targets that are older than two hours using an **ATI;SRCH** message.
 - b. Complete and transmit an **ATI;SRCH** message for a level 1 report of all targets in the FSCC's zone and any additional **ATI;SRCHs** deemed necessary.
 - c. Further limit or increase the search if the count of targets received is not satisfactory.
 - d. Transmit the search criteria requesting a level 3 report when the number of targets is satisfactory.

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CHAPTER 8

FIRE PLANNING

| | Paragraph | Page |
|----------------------------|-----------|------|
| General | 8000 | 8-3 |
| Counterfire Planning | 8001 | 8-3 |
| FASCAM Planning | 8002 | 8-3 |
| Normal Fire Planning | 8003 | 8-3 |

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MCFSS SOP**CHAPTER 8****FIRE PLANNING**

8000. **GENERAL.** This chapter addresses the fire planning procedures to be used in the 6th Marine Division. Fire planning will be divided into counterfire planning, FASCAM planning, and all other normal fire planning.

8001. **COUNTERFIRE PLANNING.** Counterfire planning is the responsibility of the artillery regiment. This responsibility is split between the TPC and regimental FDC. The procedures in paragraph 6002 of reference (c) provide a detailed explanation of counterfire planning.

8002. **FASCAM PLANNING**

1. **Authority.** Authority to fire FASCAM resides at the division FSCC. All FASCAM fire missions and fire plans must be cleared by the division FSCC.

2. **Procedures.** The procedures for building a FASCAM fire plan and for acquiring clearance for a FASCAM mission are published in paragraph 6005 of reference (c).

8003. **NORMAL FIRE PLANNING**

1. All fire planning, other than counterfire and FASCAM planning, is conducted using procedures set forth in paragraph 6003 of reference (c).

2. Quick fire support plans are created by transmitting the **TISF** from the FSCC to the FDC. The specific procedures are published in paragraph 6004 of reference (c).

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Appendix I

Sample MCFSS Plan

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**TAB J (Marine Corps Fire Support System Plan) to Appendix 12
(Fire Support) to Annex C (Operations) to Operations Order 1-94**

Ref: (a) Division MCFSS SOP V10
(b) Maps: Thailand Series L7017, 1:50,000; Ban Khun Song Sheet
5335 II and Ban Chan Khrem Sheet 5345 III

Time Zone: ZULU

1. SITUATION

See paragraph 1 of the basic order.

2. ORGANIZATION FOR COMBAT

| <u>FIRE SUPPORT</u> | <u>MISSION</u> | <u>SUPPORTING</u> |
|---------------------------|----------------|---------------------|
| <u>__/__/15/MR_ (15M)</u> | | <u>F/S/C/6_/MD_</u> |
| <u>__/__/1_/15_ (115)</u> | <u>DS</u> | <u>F/S/C/22/MR_</u> |
| <u>__/__/2_/15_ (215)</u> | <u>DS</u> | <u>F/S/C/4_/MR_</u> |
| <u>__/__/3_/15_ (315)</u> | <u>GS</u> | <u>F/S/C/6_/MD_</u> |
| | <u>O/O DS</u> | <u>F/S/C/29/MR_</u> |
| <u>__/__/5_/15_ (515)</u> | <u>R</u> | <u>__/__/2_/15_</u> |
| | <u>O/O GS</u> | <u>F/S/C/6_/MD_</u> |

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3. OBSERVER AND RADAR ASSIGNMENTS

| <u>UNIT</u> | <u>ASSIGNED OBSERVER/RADAR</u> | <u>FLOT POINTS</u> |
|--------------------|------------------------------------|--------------------|
| F/S/C/1_/4_ (1A4) | F/O/A/41/___ | 01-02 |
| | F/O/B/42/___ | 03-04 |
| | F/O/C/43/___ | 05-06 |
| F/S/C/2_/4_ (2A4) | F/O/E/44/___ | 07-08 |
| | F/O/F/45/___ | 09-10 |
| | F/O/G/46/___ | 11-12 |
| F/S/C/3_/4_ (3A4) | F/O/E/44/___ | 13-14 |
| | F/O/F/45/___ | 15-16 |
| | F/O/G/46/___ | 17-18 |
| F/S/C/1_/22_ (122) | F/O/A/21/___ | 01-02 |
| | F/O/B/22/___ | 03-04 |
| | F/O/C/23/___ | 05-06 |
| F/S/C/2_/22_ (222) | F/O/E/24/___ | 07-08 |
| | F/O/F/25/___ | 09-10 |
| | F/O/G/26/___ | 11-12 |
| F/S/C/3_/22_ (322) | F/O/E/24/___ | 13-14 |
| | F/O/F/25/___ | 15-16 |
| | F/O/G/26/___ | 17-18 |
| _/_/_/15/MR_ (15M) | C/M/R/01/___ | |
| | C/M/R/02/___ | |
| | C/M/R/03/___ | |
| | C/M/R/04/___ | |
| | U/A/V/09/___ | |
| | F/O/F/45/___ | |
| | F/O/G/46/___ | |

4. MAP MODIFICATION DATA

Maximum Easting: 202000
 Minimum Easting: 798000
 Maximum Northing: 1467000
 Minimum Northing: 1438000
 Grid Zone: +47
 Spheroid: EVEREST
 Datum: INDIAN

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5. TARGET NUMBER ASSIGNMENTS

| <u>STATION</u> | <u>TARGET BLOCK</u> |
|---------------------|---------------------|
| F/S/C/6_/MF_ (6MF) | AQ0000-0999 |
| F/S/C/6_/MD_ (6MD) | AQ1000-1999 |
| D/A/S/6_/AW_ (6AW) | AQ4000-4999 |
| F/S/C/4_/MR_ (4MR) | AD0000-0999 |
| F/S/C/1_/4_ (1A4) | AD1000-1999 |
| F/S/C/2_/4_ (2A4) | AD2000-2999 |
| F/S/C/3_/4_ (3A4) | AD3000-3999 |
| F/S/C/22_/MR_ (22M) | AS0000-0999 |
| F/S/C/1_/22_ (122) | AS1000-1999 |
| F/S/C/2_/22_ (222) | AS2000-2999 |
| F/S/C/3_/22_ (322) | AS3000-3999 |
| F/S/C/29_/MR_ (29M) | AZ0000-0999 |
| F/S/C/2_/29_ (229) | AZ2000-2999 |
| F/S/C/3_/29_ (329) | AZ3000-3999 |
| T/F/S/1_/MN_ (TFS) | AR0000-0999 |
| F/S/C/1_/29_ (129) | AR1000-1999 |
| F/S/C/6_/LAI (6LA) | AR2000-2999 |
| _J_/15/MR_ (15M) | AQ6000-6999 |
| T/P/C/15/MR_ (15T) | AQ7000-7999 |
| _J_/A/6_/27_ (627) | AQ9400-9599 |
| _J_/1_/15_ (115) | AS4000-4999 |
| _J_/A/1_/15_ (A15) | AS5000-5199 |
| _J_/B/1_/15_ (B15) | AS5200-5399 |
| _J_/C/1_/15_ (C15) | AS5400-5599 |
| _J_/2_/15_ (215) | AD4000-4999 |
| _J_/E/2_/15_ (E15) | AD5000-5199 |
| _J_/F/2_/15_ (F15) | AD5200-5399 |
| _J_/G/2_/15_ (G15) | AD5400-5599 |
| _J_/3_/15_ (315) | AQ8000-8999 |
| _J_/I/3_/15_ (I15) | AQ9000-9199 |
| _J_/L/3_/15_ (L15) | AQ9200-9399 |
| _J_/5_/15_ (515) | AD6000-6999 |
| _J_/R/5_/15_ (R15) | AD7000-7199 |
| _J_/S/5_/15_ (S15) | AD7200-7399 |
| A/R/T/Y_/GRP (GRP) | AR3000-3999 |
| _J_/K/3_/15_ (K15) | AR4000-4199 |
| _J_/Q/5_/15_ (Q15) | AR5000-5199 |

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6. COMMANDER'S CRITERIA

Make the following modifications to the commander's criteria established in reference (a).

a. FM;MOD

| <u>STATION</u> | <u>ASSIGNED ZONE</u> |
|--------------------|----------------------|
| F/S/C/6_/MD_ (6MD) | ZO16MD |
| D/A/S/6_/AW_ (6AW) | ZO16MD |
| F/S/C/3_/22_ (322) | ZO1322 |
| F/S/C/4_/MR_ (4MR) | ZO14MR |
| F/S/C/1_/4_ (1A4) | ZO11A4 |
| F/S/C/2_/4_ (2A4) | ZO12A4 |
| F/S/C/3_/4_ (3A4) | ZO13A4 |
| F/S/C/22/MR_ (22M) | ZO122M |
| F/S/C/1_/22_ (122) | ZO1122 |
| F/S/C/2_/22_ (222) | ZO1222 |
| F/S/C/3_/22_ (322) | ZO1322 |
| F/S/C/29/MR_ (29M) | ZO129M |
| F/S/C/1_/29_ (129) | ZO1129 |
| F/S/C/2_/29_ (229) | ZO1229 |
| F/S/C/3_/22_ (322) | ZO1329 |
| _/_/15/MR_ (15M) | ZO16MD |
| T/P/C/15/MR_ (15T) | ZO16MD |
| _/_/A/6_/27_ (627) | ZO16MD |
| _/_/1_/15_ (115) | ZO12MR |
| _/_/2_/15_ (215) | ZO14MR |
| _/_/3_/15_ (315) | ZO16MD |
| _/_/5_/15_ (515) | ZO14MR |
| A/R/T/Y_/GRP (GRP) | ZO1TFS |

ECOF: 0.3%

b. FM;FUSEL. As per reference (a).

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c. **FM:ATTACK**

| <u>TARGET</u> | <u>EFFECTS</u> | <u>VOLLEYS</u> |
|---------------|----------------|----------------|
| CEN/DIV | 10% | |
| RKTMSL/MDMMSL | | 4 |
| SUPPLY/AMMO | | 3 |
| SUPPLY/POL | | 3 |

d. **FM:XCLUDE**. As per reference (a).

e. **Fire Planning**. As per reference (a).

7. **ARTILLERY TARGET INTELLIGENCE**

a. **Artillery Target Intelligence Reporting**. The following will be reported in Artillery Target Intelligence (ATI) message formats:

- (1) All enemy activity that is judged by the observer as likely to remain in place for at least two hours.
- (2) FO fire missions that are denied will be entered as ATI messages if the target is likely to remain in place for at least two hours.
- (3) All nominations to the target list will be reported into the system using ATI;CDRs with the altitude entered by the reporting agency.

b. **ATI MOD FILE**. Make the following modifications at the division FSCC and the 15th Marines TPC.

(1) **ATI:FMMOD**

(a) **Target Reports to be Considered**

1 **Division FSCC**: All reports.

2 **TPC**: Solution reports only.

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(b) WTYP:31

(c) WSIZ:9

(d) WDOP:33

(e) RV:350

(2) ATI:SVMOD

(a) MAX REPORT AGE: 8 HRS

(b) MAX TIME DIFFERENCE: 2 HRS

(c) RPF:400

(d) QMOD:2.0

(e) DNARV:50

(3) ATI:DPMOD: As per reference (a).

(4) ATI:TBMOD: Targets constituting a buildup: 3.

8. BATTLEFIELD GEOMETRY

a. Current Support Data. Initial support data is provided in Enclosure 1 of this Tab.

b. Future Support Data. Future support data is entered in a plan name **FUTURE**. This data is disseminated as geometry of plan **FUTURE**. The responsible FSCC activates the measure by —

(1) Entering and transmitting a **SPRT;COMD** message deleting the current geometry by name.

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- (2) Entering and transmitting a **SPRT;COMD** using option **NEW FROM EXISTING** with the name of the specific geometry.

Each receiving station actions the **SPRT;COMD** messages to place the geometry into effect.

9. AMMUNITION AND FIRING UNITS

a. Controlled Supply Rate:

155MM: 300 rds/btry/day

105MM: 360 rds/btry/day

b. Critical Ammunition Levels:

(1) 105mm

| | | |
|-----|-----|-----|
| HEA | HEC | HER |
| 50 | 50 | 30 |

(2) 155mm

| | | |
|-----|-----|-----|
| HEA | HEF | HER |
| 50 | 50 | 30 |
| 50 | 50 | 30 |

10. COMMUNICATIONS

- a. Communications will be conducted in accordance with reference (a).
- b. The data guard chart and subscriber table are provided in Enclosures 2 and 3 of this Tab.

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11. REPORTS

- a. Battery FDC submit an **AFU;UPDATE** with **OUTTIL** immediately prior to displacement and a corrected **AFU;UPDATE** with **READY** when in place and guns are up.
- b. Battalion FDCs submit an **AFU;SR** to regimental FDC upon establishing a new COC and at 2300Z and 1400Z daily.

ACKNOWLEDGE RECEIPT

BY COMMAND OF MAJOR GENERAL LEJEUNE

S. D. BUTLER
Colonel, U.S. Marine Corps
Chief of Staff

ENCLOSURES:

- 1 - Initial Geometry
- 2 - Data Guard Chart
- 3 - Subscriber Table

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ENCLOSURE 1 (Initial Geometry) to Tab J (Marine Corps Fire Support System Plan) to Appendix 12 (Fire Support) to Annex C (Operations) to Operations Order 1-94

1. ZONES

a. ZO16MD

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 650 | 47 | 2 | 027 650 | 47 | 3 | 069 649 | 47 |
| 4 | 079 651 | 47 | 5 | 785 655 | 48 | 6 | 847 649 | 48 |
| 7 | 864 653 | 48 | 8 | 865 610 | 48 | 9 | 863 568 | 48 |
| 10 | 864 515 | 48 | 11 | 866 469 | 48 | 12 | 858 413 | 48 |
| 13 | 850 389 | 48 | 14 | 790 396 | 48 | 15 | 205 389 | 47 |
| 16 | 113 393 | 47 | 17 | 080 391 | 47 | 18 | 070 390 | 47 |
| 19 | 038 391 | 47 | 20 | BLANK | | 21 | 980 390 | 47 |

b. ZO14MR

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 650 | 47 | 2 | 027 650 | 47 | 3 | 069 649 | 47 |
| 4 | 079 651 | 47 | 5 | 785 655 | 48 | 6 | 847 649 | 48 |
| 7 | 864 653 | 48 | 8 | 865 610 | 48 | 9 | 863 568 | 48 |
| 10 | 834 563 | 48 | 11 | 750 567 | 48 | 12 | 205 569 | 47 |
| 13 | 160 564 | 47 | 14 | 088 569 | 47 | 15 | 073 574 | 47 |
| 16 | 034 575 | 47 | 17 | 013 563 | 47 | 18 | 980 560 | 47 |

c. ZO11A4

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 650 | 47 | 2 | 027 650 | 47 | 3 | 069 649 | 47 |
| 4 | 079 651 | 47 | 5 | 785 655 | 48 | 6 | 847 649 | 48 |
| 7 | 864 653 | 48 | 8 | 865 610 | 48 | 9 | 853 609 | 48 |
| 10 | 768 609 | 48 | 11 | 200 608 | 47 | 12 | 110 614 | 47 |
| 13 | 026 617 | 47 | 14 | 980 614 | 47 | | | |

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d. ZO13A4

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 614 | 47 | 2 | 026 617 | 47 | 3 | 110 614 | 47 |
| 4 | 200 608 | 47 | 5 | 768 609 | 48 | 6 | 835 609 | 48 |
| 7 | 865 610 | 48 | 8 | 863 568 | 48 | 9 | 834 563 | 48 |
| 10 | 750 567 | 48 | 11 | 205 569 | 47 | 12 | 160 564 | 47 |
| 13 | 088 569 | 47 | 14 | 073 574 | 47 | 15 | 034 575 | 47 |
| 16 | 013 563 | 47 | 17 | 980 560 | 47 | | | |

e. ZO122M

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 560 | 47 | 2 | 013 563 | 47 | 3 | 034 575 | 47 |
| 4 | 073 574 | 47 | 5 | 088 569 | 47 | 6 | 160 564 | 47 |
| 7 | 205 569 | 47 | 8 | 750 567 | 48 | 9 | 834 563 | 48 |
| 10 | 863 568 | 48 | 11 | 864 515 | 48 | 12 | 866 469 | 48 |
| 13 | 843 470 | 48 | 14 | 803 462 | 48 | 15 | 142 467 | 47 |
| 16 | 113 463 | 47 | 17 | 086 466 | 47 | 18 | 025 466 | 47 |
| 19 | 010 463 | 47 | 20 | 980 460 | 47 | | | |

f. ZO1222

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 560 | 47 | 2 | 013 563 | 47 | 3 | 034 575 | 47 |
| 4 | 073 574 | 47 | 5 | 088 569 | 47 | 6 | 160 564 | 47 |
| 7 | 205 569 | 47 | 8 | 750 567 | 48 | 9 | 834 563 | 48 |
| 10 | 863 568 | 48 | 11 | 864 515 | 48 | 12 | 250 515 | 47 |
| 13 | 128 510 | 47 | 14 | 120 507 | 47 | 15 | 108 513 | 47 |
| 16 | 033 517 | 47 | 17 | 008 539 | 47 | 18 | 980 537 | 47 |

g. ZO1322

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 537 | 47 | 2 | 008 539 | 47 | 3 | 033 517 | 47 |
| 4 | 108 513 | 47 | 5 | 120 507 | 47 | 6 | 128 510 | 47 |
| 7 | 250 515 | 47 | 8 | 264 515 | 48 | 9 | 866 469 | 48 |
| 10 | 843 470 | 48 | 11 | 803 462 | 48 | 12 | 142 467 | 47 |
| 13 | 113 463 | 47 | 14 | 086 466 | 47 | 15 | 025 466 | 47 |
| 16 | 010 463 | 47 | 17 | 980 460 | 47 | | | |

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h. ZO1TFS

ADJ ZONES:

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 980 460 | 47 | 2 | 010 463 | 47 | 3 | 025 466 | 47 |
| 4 | 086 466 | 47 | 5 | 113 463 | 47 | 6 | 142 467 | 47 |
| 7 | 803 462 | 48 | 8 | 843 470 | 48 | 9 | 866 469 | 48 |
| 10 | 858 413 | 48 | 11 | 850 389 | 48 | 12 | 790 396 | 48 |
| 13 | 205 389 | 47 | 14 | 113 393 | 47 | 15 | 080 391 | 47 |
| 16 | 070 390 | 47 | 17 | 038 391 | 47 | 18 | 980 390 | 47 |

2. FLOT

a. FL14MR

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 027 650 | 47 | 2 | 030 631 | 47 | 5 | 030 628 | 47 |
| 6 | 029 615 | 47 | 13 | 029 613 | 47 | 14 | 038 590 | 47 |
| 15 | 038 589 | 47 | 16 | 034 574 | 47 | | | |

b. FL122R

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 7 | 034 572 | 47 | 8 | 046 549 | 47 | 9 | 047 516 | 47 |
| 10 | 047 518 | 47 | 13 | 047 516 | 47 | 14 | 043 494 | 47 |
| 17 | 044 489 | 48 | 18 | 048 463 | 48 | | | |

c. FL1TFS

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 046 463 | 47 | 2 | 045 444 | 47 | 3 | 048 427 | 47 |
| 4 | 048 463 | 47 | 5 | 044 391 | 47 | | | |

3. CFL

a. CL14MR

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 068 650 | 47 | 2 | 052 623 | 47 | 3 | 065 575 | 47 |

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b. CL122R

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 053 574 | 47 | 2 | 048 562 | 47 | 3 | 052 552 | 47 |
| 4 | 060 517 | 47 | 5 | 053 491 | 47 | 6 | 058 480 | 47 |
| 7 | 056 465 | 47 | | | | | | |

c. CL1TFS

| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|-----|---------|----|
| 1 | 055 465 | 47 | 2 | 058 455 | 47 | 3 | 054 438 | 47 |
| 4 | 061 416 | 47 | 5 | 056 391 | 47 | | | |

4. FSCL

a. FS16MD

| PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|
| 1 | 770 653 | 48 | 2 | 781 395 | 48 |

5. RFL

a. RL16MD

| PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|
| 1 | 104 444 | 47 | 2 | 121 423 | 47 |

6. RFA

a. RF16MD (No WP)

| PT# | GRID | GZ | PT# | GRID | GZ |
|-----|---------|----|-----|---------|----|
| 1 | 200 575 | 47 | 2 | 210 575 | 47 |
| 3 | 220 560 | 47 | 4 | 200 560 | 47 |

7. NFA

a. NF16MD

| PT# | GRID | GZ | RADIUS |
|-----|---------|----|--------|
| 1 | 197 410 | 47 | 1000 |

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| PT# | GRID | GZ | PT# | GRID | GZ | PT# | GRID | GZ |
|------------|----------------|-----------|------------|----------------|-----------|------------|----------------|-----------|
| 1 | 790 454 | 48 | 2 | 777 427 | 48 | 3 | 798 405 | 48 |

9. PHASE LINES**a. PLBLUE**

| PT# | GRID | GZ | PT# | GRID | GZ |
|------------|----------------|-----------|------------|----------------|-----------|
| 1 | 069 650 | 47 | 2 | 070 390 | 47 |

b. PLRED

| PT# | GRID | GZ | PT# | GRID | GZ |
|------------|----------------|-----------|------------|----------------|-----------|
| 1 | 115 393 | 47 | 2 | 113 660 | 47 |

c. PLGRN

| PT# | GRID | GZ | PT# | GRID | GZ |
|------------|----------------|-----------|------------|----------------|-----------|
| 1 | 151 390 | 47 | 2 | 189 460 | 47 |
| 3 | 199 506 | 47 | 4 | 211 564 | 47 |
| 5 | 230 650 | 47 | | | |

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ENCLOSURE 2 (Data Guard Chart) to Tab J (Marine Corps Fire Support System Plan) to Appendix 12 (Fire Support) to Annex C (Operations) to Operations Order 1-94

| Legend: C=Net Control X=Guard A=As Required W=When Directed R=Relay | 6MF MEF FSC NET | 6MD DIV FSC NET | 4MR REGT FSC NET | 22M REGT FSC NET | 29M REGT FSC NET | TFS REGT FSC NET | 15M REGT FD2 NET | TPC WIRE NET | TPC MET/RDR TEL NET | 115 COF A | 115 COF B | 215 COF A | 215 COF B | 315 COF A | 315 COF B | 515 COF A | 515 COF B | GRP COF A | GRP COF B |
|---|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|--------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Keytime | 0.7 | 0.7 | 0.7 | 2.1 | 2.1 | 1.4 | 0.7 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| FSK 1=12/24 2=13/21 D=digital | D | D | D | 1 | 1 | D | D | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| BLK MODE | | | | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Data Rate (bps) | 4800 | 4800 | 4800 | 1200 | 1200 | 4800 | 4800 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |
| COM- SEC | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 6MF FFCC | C | | | | | | | | | | | | | | | | | | |
| 6MD FSCC | X | C | | | | | | R | | | | | | | | | | | |
| 6AW DASC | | X | | | | | | | | | | | | | | | | | |

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| Legend: C=Net Control X=Guard A=As Required W=When Directed R=Relay | 6MF MEF FSC NET | 6MD DIV FSC NET | 4MR REGT FSC NET | 22M REGT FSC NET | 29M REGT FSC NET | TFS REGT FSC NET | 15M REGT FD2 NET | TPC WIRE NET | TPC MET/RDR TEL NET | 115 COF A | 115 COF B | 215 COF A | 215 COF B | 315 COF A | 315 COF B | 515 COF A | 515 COF B | GRP COF A | GRP COF B |
|---|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|--------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 4MR FSCC | | X | C | | | | | R | | | | | | | | | | | |
| 1A4 FSC+FOs | | | X | | | | | | | | | X | | | | | | | |
| 2A4 FSC+FOs | | | X 1 | | | | | | | | | X | | | | | | | |
| 3A4 FSC+FOs | | | X 1 | | | | | | | | | | X | | | | | | |
| 22M FSCC | X | X | | C | | | | R | | | | | | | | | | | |
| 122 FSC+FOs | | | | X 1 | | | | | | X | | | | | | | | | |
| 222 FSC+FOs | | | | X 1 | | | | | | X | | | | | | | | | |
| 322 FSC+FOs | | | | X 1 | | | | | | | X | | | | | | | | |
| 29M FSCC | | X | | | C | | | R | | | | | | | | | | | |
| 229 FSC+FOs | | | | | X 1 | | | | | | | | | | | | | | |
| 329 FSC+FOs | | | | | X 1 | | | | | | | | | | | | | | |
| TFS FSCC | | X | | | | C | | R | | | | | | | | | | | |
| 129 FSC+FOs | | | | | | X 1 | | | | | | | | | | | | X | |
| 6LA FSC+FOs | | | | | | X 1 | | | | | | | | | | | | | X |

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| Legend: C=Net Control X=Guard A=As Required W=When Directed R=Relay | 6MF MEF FPC NET | 6MD DIV FSC NET | 4MR REGT FSC NET | 22M REGT FSC NET | 29M REGT FSC NET | TFS REGT FSC NET | 15M REGT FD2 NET | TPC WIRE NET | TPC MET/RDR TEL NET | 115 COF A | 115 COF B | 215 COF A | 215 COF B | 315 COF A | 315 COF B | 515 COF A | 515 COF B | GRP COF A | GRP COF B |
|---|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|--------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 15M FDC | | X | | | | | C | C | | | | | | | | | | | |
| 15M TPC | | R | | | | | R | X | C | | | | | | | | | | |
| 15M MET | | | | | | | | | X | | | | | | | | | | |
| 15M RADAR | | | | | | | | | X | | | | | | | | | | |
| UAV | | | | | | | | | X | | | | | | | | | | |
| 115 FDC | | | | X | | | X | | | C | C | | | | | | | | |
| A15 FDC | | | | | | | | | | X | | | | | | | | | |
| B15 FDC | | | | | | | | | | X | | | | | | | | | |
| C15 FDC | | | | | | | | | | | X | | | | | | | | |
| 215 FDC | | | X | | | | X | | | | | C | C | | | | | | |
| E15 FDC | | | | | | | | | | | | X | | | | | | | |
| F15 FDC | | | | | | | | | | | | X | | | | | | | |
| G15 FDC | | | | | | | | | | | | | X | | | | | | |
| 315 FDC | | | | | | | X | | | | | | | | C | C | C | | |

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| <u>Legend:</u> C=Net Control X=Guard A=As Required W=When Directed R=Relay | 6MF MEF FSC NET | 6MD DIV FSC NET | 4MR REGT FSC NET | 22M RBGT FSC NET | 29M REGT FSC NET | TFS REGT FSC NET | 15M REGT FD2 NET | TPC WIRE NET | TPC MET/RDR TEL NET | 115 COF A | 115 COF B | 215 COF A | 215 COF B | 315 COF A | 315 COF B | 515 COF A | 515 COF B | GRP COF A | GRP COF B |
|--|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|--------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| I15 FDC | | | | | | | | | | | | | | X | | | | | |
| L15 FDC | | | | | | | | | | | | | | | X | X | | | |
| 515 FDC | | | | | | | X | | | | | | | | | | C | C | |
| R15 FDC | | | | | | | | | | | | | | | | X | | | |
| S15 FDC | | | | | | | | | | | | | | | | | X | | |
| GRP FDC | | | | | | | X | | | | | | | | | | | C | C |
| K15 FDC | | | | | | | | | | | | | | | | | | X | |
| Q15 FDC | | | | | | | | | | | | | | | | | | | X |
| A27 FDC | | | | | | | X | | | | | | | | | | | | |

NOTE 1: Battalion FSCC only.

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ENCLOSURE 3 (Subscriber Table) to Tab J (Marine Corps Fire Support System Plan) to Appendix 12 (Fire Support) to Annex C (Operations) to Operations Order 1-94

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
|--------|--------------|--------------|-------------|---------|---------|-------|--------|-----------------|
| 10 | F/F/C/6_/MF | MEF FFC | 1_/2_/2_/3_ | A | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
| 11 | MEF FFC | F/W/D/6_/MEF | BN FDC | I | I | 4M/M4 | OTHER | |
| 12 | | _/_/6_/MD_ | BN FDC | B | B | 5M/M6 | OTHER | |
| 13 | | F/W/D/6_/DIV | BN FDC | C | C | 6M/M6 | OTHER | |
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
| 14 | D/A/S/6_/AW_ | DIV FSC | 2_/3_/3_/4_ | 2 | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
| 15 | DIV FSC | D/A/S/6_/FWD | BN FDC | 3 | 3 | V4/4V | OTHER | |
| 16 | | F/S/C/6_/MD_ | BN FDC | 0 | 0 | 0S/S0 | OTHER | |
| 17 | | F/W/D/6_/DIV | BN FDC | 1 | 1 | 1T/T1 | OTHER | |
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
| 18 | F/S/C/6_/MD_ | DIV FSC | 1_/2_/2_/3_ | 0 | N/A | | | |
| 19 | F/S/C/6_/MD_ | MEF FFC | 2_/3_/3_/4_ | B | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID | AGENCY | MULTISUBS GROUP |
| 20 | DIV FSC | F/W/D/6_/DIV | BN FDC | 1 | 1 | C0/0C | OTHER | |
| 21 | | D/A/S/6_/AW_ | BN FDC | 2 | 2 | S0/0S | OTHER | |
| 22 | | D/A/S/6_/FWD | BN FDC | 3 | 3 | U2/2U | OTHER | |
| 23 | | F/S/C/4_/MR_ | BN FDC | 4 | 4 | D1/1D | OTHER | |
| 24 | | F/W/D/4_/MAR | BN FDC | 5 | 5 | D2/2D | OTHER | |
| 25 | | F/S/C/22/MR_ | BN FDC | 6 | 6 | D3/3D | OTHER | |
| 26 | | F/W/D/22/MAR | BN FDC | 7 | 7 | D4/4D | OTHER | |
| 27 | | F/S/C/29/MR_ | BN FDC | 8 | 8 | D5/5D | OTHER | |
| 28 | | F/W/D/29/MAR | BN FDC | ? | ? | D6/6D | OTHER | |
| 29 | | T/F/S/1_/MN_ | BN FDC | + | + | ES/SE | OTHER | |
| 30 | | T/F/S/1_/FW_ | BN FDC | . | . | FK/KF | OTHER | |
| 31 | | _/_/15/MR_ | BN FDC | 9 | 9 | Q9/9Q | OTHER | |
| 32 | | F/W/D/15/MAR | BN FDC | * | * | R9/9R | OTHER | |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|--------------|------------------|------------|------------|-------------|--------|--------------------|
| 33 | | T/P/C/15/MR_ | RELAY/ BN FDC | 9 | 9 | | OTHER | |
| 34 | | F/W/D/15/TPC | RELAY/ BN FDC | 9 | 9 | | OTHER | |
| 35 | MEF FFC | F/F/C/6 /MF_ | BN FDC | A | A | M5/5M | OTHER | |
| 36 | | F/W/D/6 /MEF | BN FDC | I | I | N3/3N | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|------------|------------|------------|
| 37 | F/S/C/4 /MR_ | DIV FSC | 2_3_3_4_ | 4 | N/A |
| 38 | F/S/C/4 /MR_ | REGT FSC | 1_2_2_3_ | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|---------------|--------|------------|------------|-------------|--------|--------------------|
| 39 | DIV FSC | F/S/C/6 /MD_ | BN FDC | 0 | 0 | 1D/D1 | OTHER | |
| 40 | | F/W/D/6 /DIV | BN FDC | 1 | 1 | 7D/D7 | OTHER | |
| 41 | | D/A/S/6 /AW_ | BN FDC | 2 | 2 | T2/2T | OTHER | |
| 42 | | D/A/S/6 /FWD | BN FDC | 3 | 3 | U4/4U | OTHER | |
| 43 | | F/S/C/22/MR_ | BN FDC | 6 | 6 | E4/4E | OTHER | |
| 44 | | F/W/D/22/MAR | BN FDC | 7 | 7 | E5/5E | OTHER | |
| 45 | | F/S/C/29/MR_ | BN FDC | 8 | 8 | E6/6E | OTHER | |
| 46 | | F/W/D/29/MAR | BN FDC | ? | ? | E7/7E | OTHER | |
| 47 | | T/F/S/1 /MN_ | BN FDC | + | + | EU/UE | OTHER | |
| 48 | | T/F/S/1 /FW_ | BN FDC | . | . | FM/MF | OTHER | |
| 49 | | _ / /15/MR_ | BN FDC | 9 | 9 | R1/1R | OTHER | |
| 50 | | F/W/D/15/MAR | BN FDC | * | * | S1/1S | OTHER | |
| 51 | REGT FSC | F/W/D/4 /MAR | BN FDC | B | B | F8/8F | OTHER | |
| 52 | | F/S/C/1 /4_ | BN FDC | C | C | G1/1G | OTHER | |
| 53 | | F/W/D/1 /4MR | BN FDC | D | D | G2/2G | OTHER | |
| 54 | | F/S/C/2 /4_ | BN FDC | E | E | G3/3G | OTHER | |
| 55 | | F/W/D/2 /4MR | BN FDC | F | F | G4/4G | OTHER | |
| 56 | | F/S/C/3 /4_ | BN FDC | G | G | G5/5G | OTHER | |
| 57 | | F/W/D/3 /4MR | BN FDC | H | H | G6/6G | OTHER | |
| 58 | | _ / /2_ /15_ | BN FDC | I | I | F9/9F | OTHER | |
| 59 | | F/W/D/2_ /15M | BN FDC | J | J | F0/0F | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|------------|------------|------------|
| 60 | F/S/C/22/MR_ | DIV FSC | 2_3_3_4_ | 6 | N/A |
| 61 | F/S/C/22/MR_ | REGT FSC | 1_2_2_3_ | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 62 | DIV FSC | F/S/C/6 /MD_ | BN FDC | 0 | 0 | 3D/D3 | OTHER | |
| 63 | | F/W/D/6 /DIV | BN FDC | 1 | 1 | 9D/D9 | OTHER | |
| 64 | | D/A/S/6 /AW_ | BN FDC | 2 | 2 | T4/4T | OTHER | |
| 65 | | D/A/S/6 /FWD | BN FDC | 3 | 3 | U6/6U | OTHER | |
| 66 | | F/S/C/4 /MR_ | BN FDC | 4 | 4 | 4E/E4 | OTHER | |
| 67 | | F/W/D/4 /MAR | BN FDC | 5 | 5 | 8E/E8 | OTHER | |
| 68 | | F/S/C/29/MR_ | BN FDC | 8 | 8 | F3/3F | OTHER | |
| 69 | | F/W/D/29/MAR | BN FDC | ? | ? | F4/4F | OTHER | |
| 70 | | T/F/S/1 /MN_ | BN FDC | + | + | FG/GF | OTHER | |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 71 | | T/F/S/1_/FW_ | BN FDC | . | . | FO/OF | OTHER | |
| 72 | | _/_/15/MR_ | BN FDC | 9 | 9 | R3/3R | OTHER | |
| 73 | | FW/D/15/MAR | BN FDC | * | * | S3/3S | OTHER | |
| 74 | REGT FSC | FW/D/22/MAR | BN FDC | B | B | F8/8F | OTHER | |
| 75 | | F/S/C/1_/22_ | BN FDC | C | C | G1/1G | OTHER | |
| 76 | | FW/D/1_/22M | BN FDC | D | D | G2/2G | OTHER | |
| 77 | | F/S/C/2_/22_ | BN FDC | E | E | G3/3G | OTHER | |
| 78 | | FW/D/2_/22M | BN FDC | F | F | G4/4G | OTHER | |
| 79 | | F/S/C/3_/22_ | BN FDC | G | G | G5/5G | OTHER | |
| 80 | | FW/D/3_/22M | BN FDC | H | H | G6/6G | OTHER | |
| 81 | | _/_/1_/15_ | BN FDC | I | I | F9/9F | OTHER | |
| 82 | | FW/D/1_/15M | BN FDC | J | J | F0/0F | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|------------|------------|
| 83 | F/S/C/29/MR_ | DIV FSC | 2_/3_/3_/4_ | 8 | N/A |
| 84 | F/S/C/29/MR_ | REGT FSC | 1_/2_/2_/3_ | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 85 | DIV FSC | F/S/C/6_/MD_ | BN FDC | 0 | 0 | 5D/D5 | OTHER | |
| 86 | | FW/D/6_/DIV | BN FDC | 1 | 1 | 1E/E1 | OTHER | |
| 87 | | D/A/S/6_/AW_ | BN FDC | 2 | 2 | T6/6T | OTHER | |
| 88 | | D/A/S/6_/FWD | BN FDC | 3 | 3 | U8/8U | OTHER | |
| 89 | | F/S/C/4_/MR_ | BN FDC | 4 | 4 | 6E/E6 | OTHER | |
| 90 | | FW/D/4_/MAR | BN FDC | 5 | 5 | 0E/E0 | OTHER | |
| 91 | | F/S/C/22/MR_ | BN FDC | 6 | 6 | 3F/F3 | OTHER | |
| 92 | | FW/D/22/MAR | BN FDC | 7 | 7 | 5F/F5 | OTHER | |
| 93 | | T/F/S/1_/MN_ | BN FDC | + | + | F1/IF | OTHER | |
| 94 | | T/F/S/1_/FW_ | BN FDC | . | . | FQ/QF | OTHER | |
| 95 | | _/_/15/MR_ | BN FDC | 9 | 9 | R5/5R | OTHER | |
| 96 | | FW/D/15/MAR | BN FDC | * | * | S5/5S | OTHER | |
| 97 | REGT FSC | FW/D/29/MAR | BN FDC | B | B | F8/8F | OTHER | |
| 98 | | F/S/C/2_/29_ | BN FDC | E | E | G1/1G | OTHER | |
| 99 | | FW/D/2_/29M | BN FDC | F | F | G2/2G | OTHER | |
| 100 | | F/S/C/3_/29_ | BN FDC | G | G | G3/3G | OTHER | |
| 101 | | FW/D/3_/29M | BN FDC | H | H | G4/4G | OTHER | |
| 102 | | _/_/1_/15_ | BN FDC | I | I | F9/9F | OTHER | |
| 103 | | FW/D/1_/15M | BN FDC | J | J | F0/0F | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|------------|------------|
| 104 | T/F/S/1_/MN_ | DIV FSC | 2_/3_/3_/4_ | + | N/A |
| 105 | T/F/S/1_/MN_ | REGT FSC | 1_/2_/2_/3_ | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 106 | DIV FSC | F/S/C/6_/MD_ | BN FDC | 0 | 0 | SE/ES | OTHER | |
| 107 | | FW/D/6_/DIV | BN FDC | 1 | 1 | TE/ET | OTHER | |
| 108 | | D/A/S/6_/AW_ | BN FDC | 2 | 2 | T8/8T | OTHER | |
| 109 | | D/A/S/6_/FWD | BN FDC | 3 | 3 | U0/0U | OTHER | |
| 110 | | F/S/C/4_/MR_ | BN FDC | 4 | 4 | UE/EU | OTHER | |

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UNCLASSIFIED

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 111 | | FW/D/4_/MAR | BN FDC | 5 | 5 | VE/EV | OTHER | |
| 112 | | F/S/C/22/MR_ | BN FDC | 6 | 6 | GF/FG | OTHER | |
| 113 | | FW/D/22/MAR | BN FDC | 7 | 7 | HF/FH | OTHER | |
| 114 | | F/S/C/29/MR_ | BN FDC | 8 | 8 | IF/FI | OTHER | |
| 115 | | FW/D/29/MAR | BN FDC | ? | ? | JF/FJ | OTHER | |
| 116 | | _/_/15/MR_ | BN FDC | 9 | 9 | R7/7R | OTHER | |
| 117 | | FW/D/15/MAR | BN FDC | * | * | S7/7S | OTHER | |
| 118 | REGT FSC | T/F/S/1_/FWD | BN FDC | B | B | F8/8F | OTHER | |
| 119 | | F/S/C/1_/29_ | BN FDC | C | C | G1/1G | OTHER | |
| 120 | | FW/D/1_/29M | BN FDC | D | D | G2/2G | OTHER | |
| 121 | | F/S/C/6_/LAI | BN FDC | E | E | G3/3G | OTHER | |
| 122 | | FW/D/6_/LAI | BN FDC | F | F | G4/4G | OTHER | |
| 123 | | A/R/T/Y_/GRP | BN FDC | I | I | F9/9F | OTHER | |
| 124 | | A/R/T/Y_/FWD | BN FDC | J | J | F0/0F | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|-------------|----------|-------------|------------|------------|
| 125 | F/S/C/1_/4_ | REGT FSC | 2_/3_/3_/4_ | C | N/A |
| 126 | F/S/C/1_/4_ | COF A | 2_/3_/3_/4_ | | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 127 | REGT FSC | FW/D/1_/4MR | BN FDC | D | D | J6/6J | OTHER | |
| 128 | | F/S/C/4_/MR_ | BN FDC | A | A | 1G/G1 | OTHER | |
| 129 | | FW/D/4_/MAR | BN FDC | B | B | 1H/H1 | OTHER | |
| 130 | | F/S/C/2_/4_ | BN FDC | E | E | K3/3K | OTHER | |
| 131 | | FW/D/2_/4MR | BN FDC | F | F | K4/4K | OTHER | |
| 132 | | F/S/C/3_/4_ | BN FDC | G | G | K5/5K | OTHER | |
| 133 | | FW/D/3_/4MR | BN FDC | H | H | K6/6K | OTHER | |
| 134 | COF A | _/_/2_/15_ | BN FDC | A | A | 5M/M5 | OTHER | |
| 135 | | FW/D/2_/15M | BN FDC | B | B | 3N/N3 | OTHER | |
| 136 | | F/O/A/4/1_ | BN FDC | E | | O4/4O | FOWOL | |
| 137 | | F/O/B/4/2_ | BN FDC | F | | O5/5O | FOWOL | |
| 138 | | F/O/C/4/3_ | BN FDC | G | | O6/6O | FOWOL | |
| 139 | | _/_E/2_/15_ | BCS | I | I | O2/2O | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|-------------|----------|-------------|------------|------------|
| 140 | F/S/C/3_/4_ | REGT FSC | 2_/3_/3_/4_ | G | N/A |
| 141 | F/S/C/3_/4_ | COF B | _/_/1_ | | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 142 | REGT FSC | FW/D/3_/4MR | BN FDC | H | H | F8/8F | OTHER | |
| 143 | | F/S/C/4_/MR_ | BN FDC | A | A | G1/1G | OTHER | |
| 144 | | FW/D/4_/MAR | BN FDC | B | B | G2/2G | OTHER | |
| 145 | | F/S/C/1_/4_ | BN FDC | C | C | G3/3G | OTHER | |
| 146 | | FW/D/1_/4MR | BN FDC | D | D | G4/4G | OTHER | |
| 147 | | F/S/C/2_/4_ | BN FDC | E | E | G5/5G | OTHER | |
| 148 | | FW/D/2_/4MR | BN FDC | F | F | G6/6G | OTHER | |
| 149 | COF B | _/_/2_/15_ | BN FDC | A | A | 5V/V5 | OTHER | |
| 150 | | FW/D/1_/15M | BN FDC | B | B | DA/AD | OTHER | |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-----|--------------|--------|------------|------------|-------------|--------|--------------------|
| 151 | | F/O/I/47/___ | DMD | E | | AO/OA | FOWOL | |
| 152 | | F/O/K/48/___ | DMD | F | | AP/PA | FOWOL | |
| 153 | | F/O/L/49/___ | DMD | G | | AQ/QA | FOWOL | |
| 154 | | _J_G/2_/15_ | BCS | I | I | AM/MA | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|------------|------------|
| 155 | F/S/C/2_/22_ | REGT FSC | 2_/3_/3_/4_ | E | N/A |
| 156 | F/S/C/2_/22_ | COF A | 2_/3_/3_/4_ | C | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 157 | REGT FSC | F/W/D/2_/22M | BN FDC | F | F | K9/9K | OTHER | |
| 158 | | F/S/C/22/MR_ | BN FDC | A | A | 3G/G3 | OTHER | |
| 159 | | F/W/D/22/MAR | BN FDC | B | B | 3H/H3 | OTHER | |
| 160 | | F/S/C/1_/22_ | BN FDC | C | C | 7J/J7 | OTHER | |
| 161 | | F/W/D/1_/22M | BN FDC | D | D | 3K/K3 | OTHER | |
| 162 | | F/S/C/3_/22_ | BN FDC | G | G | K0/OK | OTHER | |
| 163 | | F/W/D/3_/22M | BN FDC | H | H | L1/1L | OTHER | |
| 164 | COF A | _J_/1_/15_ | BN FDC | A | A | 0Q/Q0 | OTHER | |
| 165 | | F/W/D/1_/15M | BN FDC | B | B | 8R/R8 | OTHER | |
| 166 | | F/O/E/24/___ | DMD | M | | S9/9S | FOWOL | |
| 167 | | F/O/F/25/___ | DMD | N | | S0/0S | FOWOL | |
| 168 | | F/O/G/26/___ | DMD | O | | T1/1T | FOWOL | |
| 169 | | _J_/B/1_/15_ | BCS | 0 | 0 | T3/3T | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|------------|------------|
| 170 | F/S/C/3_/22_ | REGT FSC | 2_/3_/3_/4_ | G | N/A |
| 171 | F/S/C/3_/22_ | COF B | _J_/1_/1_ | | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 172 | REGT FSC | F/W/D/3_/22M | BN FDC | H | H | L8/8L | OTHER | |
| 173 | | F/S/C/22/MR_ | BN FDC | A | A | 5G/G5 | OTHER | |
| 174 | | F/W/D/22/MAR | BN FDC | B | B | 5H/H5 | OTHER | |
| 175 | | F/S/C/1_/22_ | BN FDC | C | C | 9J/J9 | OTHER | |
| 176 | | F/W/D/1_/22M | BN FDC | D | D | 5K/K5 | OTHER | |
| 177 | | F/S/C/2_/22_ | BN FDC | E | E | 0K/K0 | OTHER | |
| 178 | | F/W/D/2_/22M | BN FDC | F | F | 4L/L4 | OTHER | |
| 179 | COF B | _J_/1_/15_ | BN FDC | A | C | 5V/V5 | OTHER | |
| 180 | | F/W/D/1_/15M | BN FDC | B | D | DA/AD | OTHER | |
| 181 | | F/O/I/27/___ | DMD | E | | AO/OA | FOWOL | |
| 182 | | F/O/K/28/___ | DMD | F | | AP/PA | FOWOL | |
| 183 | | F/O/L/29/___ | DMD | G | | AQ/QA | FOWOL | |
| 184 | | _J_/C/1_/15_ | BCS | I | I | AM/MA | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|------------|------------|
| 185 | F/S/C/1_/29_ | REGT FSC | 2_/3_/3_/4_ | C | N/A |
| 186 | F/S/C/1_/29_ | COF A | 2_/3_/3_/4_ | C | N/A |

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UNCLASSIFIED

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|---------|---------|----------|--------|-----------------|
| 187 | REGT FSC | F/W/D/1_/29M | BN FDC | D | D | J6/6J | OTHER | |
| 188 | | T/F/S/1_/MN_ | BN FDC | A | A | 1G/G1 | OTHER | |
| 189 | | T/F/S/1_/FWD | BN FDC | B | B | 1H/H1 | OTHER | |
| 190 | | F/S/C/6_/LAI | BN FDC | E | E | J7/J7 | OTHER | |
| 191 | | F/W/D/6_/LAI | BN FDC | F | F | J8/J8 | OTHER | |
| 192 | COF A | A/R/T/Y_/GRP | BN FDC | A | A | 5M/M5 | OTHER | |
| 193 | | A/R/T/Y_/FWD | BN FDC | B | B | 3N/N3 | OTHER | |
| 194 | | F/O/A/91/___ | DMD | E | | O4/4O | FOWOL | |
| 195 | | F/O/B/92/___ | DMD | F | | O5/5O | FOWOL | |
| 196 | | F/O/C/93/___ | DMD | G | | O6/6O | FOWOL | |
| 197 | | _/_/K/3_/15_ | BCS | I | I | O2/2O | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|---------|---------|
| 198 | F/S/C/6_/LAI | REGT FSC | 2_/3_/3_/4_ | E | N/A |
| 199 | F/S/C/6_/LAI | COF B | _/_/_/_ | | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|---------|---------|----------|--------|-----------------|
| 200 | REGT FSC | F/W/D/6_/LAI | BN FDC | F | F | K9/9K | OTHER | |
| 201 | | T/F/S/1_/MN_ | BN FDC | A | A | 3G/G3 | OTHER | |
| 202 | | T/F/S/1_/FWD | BN FDC | B | B | 3H/H3 | OTHER | |
| 203 | | F/S/C/1_/29_ | BN FDC | C | C | 7J/J7 | OTHER | |
| 204 | | F/W/D/1_/29M | BN FDC | D | D | 3K/K3 | OTHER | |
| 205 | COF B | A/R/T/Y_/GRP | BN FDC | A | A | 0Q/Q0 | OTHER | |
| 206 | | A/R/T/Y_/FWD | BN FDC | B | B | 8R/R8 | OTHER | |
| 207 | | F/O/A/61/___ | DMD | E | | S8/8S | FOWOL | |
| 208 | | F/O/B/62/___ | DMD | F | | S9/9S | FOWOL | |
| 209 | | F/O/C/49/___ | DMD | G | | S0/0S | FOWOL | |
| 210 | | _/_/Q/5_/15_ | BCS | I | I | S7/7S | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|---------|---------|
| 211 | F/O/A/21/___ | COF A | 4 | E | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|---------|---------|----------|--------|-----------------|
| 212 | COF A | _/_/1_/15_ | Y | A | | | | |
| 213 | | F/W/D/1_/15M | Y | B | | | | |
| 214 | | F/S/C/1_/22_ | Y | C | | | | |
| 215 | | F/W/D/1_/22M | Y | D | | | | |
| 216 | | _/_/A/1_/15_ | Y | I | | | | |
| 217 | | F/O/B/22/___ | N | F | | | | |
| 218 | | F/O/C/23/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|------|------------|---------|---------|
| 219 | F/O/B/22/___ | COFA | 4 | F | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---------------|--------|------------|------------|-------------|--------|--------------------|
| 220 | COF A | _ / / /1 /15_ | Y | A | | | | |
| 221 | | F/W/D/1 /15M | Y | B | | | | |
| 222 | | F/S/C/1 /22_ | Y | C | | | | |
| 223 | | F/W/D/1 /22M | Y | D | | | | |
| 224 | | _ / /A/1 /15_ | Y | I | | | | |
| 225 | | F/O/A/21/___ | N | E | | | | |
| 226 | | F/O/C/23/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 227 | F/O/C/23/___ | COF A | 4 | G | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---------------|--------|------------|------------|-------------|--------|--------------------|
| 228 | COF A | _ / / /1 /15_ | Y | A | | | | |
| 229 | | F/W/D/1 /15M | Y | B | | | | |
| 230 | | F/S/C/1 /22_ | Y | C | | | | |
| 231 | | F/W/D/1 /22M | Y | D | | | | |
| 232 | | _ / /A/1 /15_ | Y | I | | | | |
| 233 | | F/O/A/21/___ | N | E | | | | |
| 234 | | F/O/B/22/___ | N | F | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 235 | F/O/E/24/___ | COF A | 4 | M | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---------------|--------|------------|------------|-------------|--------|--------------------|
| 236 | COF A | _ / / /1 /15_ | Y | A | | | | |
| 237 | | F/W/D/1 /15M | Y | B | | | | |
| 238 | | F/S/C/2 /22_ | Y | K | | | | |
| 239 | | F/W/D/2 /22M | Y | L | | | | |
| 240 | | _ / /B/1 /15_ | Y | O | | | | |
| 241 | | F/O/F/25/___ | N | N | | | | |
| 242 | | F/O/G/26/___ | N | O | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 243 | F/O/F/25/___ | COF A | 4 | M | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---------------|--------|------------|------------|-------------|--------|--------------------|
| 244 | COF A | _ / / /1 /15_ | Y | A | | | | |
| 245 | | F/W/D/1 /15M | Y | B | | | | |
| 246 | | F/S/C/2 /22_ | Y | K | | | | |
| 247 | | F/W/D/2 /22M | Y | L | | | | |
| 248 | | _ / /B/1 /15_ | Y | O | | | | |
| 249 | | F/O/E/24/___ | N | M | | | | |
| 250 | | F/O/G/26/___ | N | O | | | | |

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| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 251 | F/O/G/26/___ | COF A | 4 | O | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 252 | COF A | _J_J/1/15_ | Y | A | | | | |
| 253 | | F/W/D/1/15M | Y | B | | | | |
| 254 | | F/S/C/2/22_ | Y | K | | | | |
| 255 | | F/W/D/2/22M | Y | L | | | | |
| 256 | | _J/B/1/15_ | Y | O | | | | |
| 257 | | F/O/E/24/___ | N | M | | | | |
| 258 | | F/O/F/25/___ | N | N | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 259 | F/O/I/27/___ | COF B | 4 | G | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 260 | COF B | _J_J/1/15_ | Y | A | | | | |
| 261 | | F/W/D/1/15M | Y | B | | | | |
| 262 | | F/S/C/3/22_ | Y | C | | | | |
| 263 | | F/W/D/3/22M | Y | D | | | | |
| 264 | | _J/C/1/15_ | Y | I | | | | |
| 265 | | F/O/K/28/___ | N | F | | | | |
| 266 | | F/O/L/29/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 267 | F/O/K/28/___ | COF B | 4 | F | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 268 | COF B | _J_J/1/15_ | Y | A | | | | |
| 269 | | F/W/D/1/15M | Y | B | | | | |
| 270 | | F/S/C/3/22_ | Y | C | | | | |
| 271 | | F/W/D/3/22M | Y | D | | | | |
| 272 | | _J/C/1/15_ | Y | I | | | | |
| 273 | | F/O/I/27/___ | N | E | | | | |
| 274 | | F/O/L/29/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 275 | F/O/L/29/___ | COF B | 4 | G | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 276 | COF B | _J_J/1/15_ | Y | A | | | | |
| 277 | | F/W/D/1/15M | Y | B | | | | |
| 278 | | F/S/C/3/22_ | Y | C | | | | |
| 279 | | F/W/D/3/22M | Y | D | | | | |
| 280 | | _J/C/1/15_ | Y | I | | | | |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-----|--------------|--------|------------|------------|-------------|--------|--------------------|
| 281 | | F/O/I/27/___ | N | E | | | | |
| 282 | | F/O/K/28/___ | N | F | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 283 | F/O/A/41/___ | COF A | 4 | E | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 284 | COF A | / / J2 /15_ | Y | A | | | | |
| 285 | | F/W/D/2 /15M | Y | B | | | | |
| 286 | | F/S/C/1 /4_ | Y | C | | | | |
| 287 | | F/W/D/1 /4MR | Y | D | | | | |
| 288 | | / / E/2 /15_ | Y | 0 | | | | |
| 289 | | F/O/B/42/___ | N | F | | | | |
| 290 | | F/O/C/43/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 291 | F/O/B/42/___ | COF A | 4 | F | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 292 | COF A | / / J2 /15_ | Y | A | | | | |
| 293 | | F/W/D/2 /15M | Y | B | | | | |
| 294 | | F/S/C/1 /4_ | Y | C | | | | |
| 295 | | F/W/D/1 /4MR | Y | D | | | | |
| 296 | | / / E/2 /15_ | Y | 0 | | | | |
| 297 | | F/O/A/41/___ | N | E | | | | |
| 298 | | F/O/C/43/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 299 | F/O/C/43/___ | COF A | 4 | G | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|------------|------------|-------------|--------|--------------------|
| 300 | COF A | / / J2 /15_ | Y | A | | | | |
| 301 | | F/W/D/2 /15M | Y | B | | | | |
| 302 | | F/S/C/1 /4_ | Y | C | | | | |
| 303 | | F/W/D/1 /4MR | Y | D | | | | |
| 304 | | / / E/2 /15_ | Y | 0 | | | | |
| 305 | | F/O/A/41/___ | N | E | | | | |
| 306 | | F/O/B/42/___ | N | F | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|------------|------------|
| 307 | F/O/I/47/___ | COF A | 3 | E | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---|--------|---------|---------|----------|--------|-----------------|
| 308 | COF A | <u> </u> / <u> </u> | Y | A | | | | |
| 309 | | F/W/D/2_/15M | Y | B | | | | |
| 310 | | F/S/C/3_/4_ | Y | C | | | | |
| 311 | | F/W/D/3_/4MR | Y | D | | | | |
| 312 | | <u> </u> / <u> </u> | Y | I | | | | |
| 313 | | F/O/K/48/___ | N | F | | | | |
| 314 | | F/O/L/49/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|---------|---------|
| 315 | F/O/K/48/___ | COF A | 3 | F | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---|--------|---------|---------|----------|--------|-----------------|
| 316 | COF A | <u> </u> / <u> </u> | Y | A | | | | |
| 317 | | F/W/D/2_/15M | Y | B | | | | |
| 318 | | F/S/C/3_/4_ | Y | C | | | | |
| 319 | | F/W/D/3_/4MR | Y | D | | | | |
| 320 | | <u> </u> / <u> </u> | Y | I | | | | |
| 321 | | F/O/I/47/___ | N | E | | | | |
| 322 | | F/O/L/49/___ | N | G | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|---------|---------|
| 323 | F/O/L/49/___ | COF A | 3 | G | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---|--------|---------|---------|----------|--------|-----------------|
| 324 | COF A | <u> </u> / <u> </u> | Y | A | | | | |
| 325 | | F/W/D/2_/15M | Y | B | | | | |
| 326 | | F/S/C/3_/4_ | Y | C | | | | |
| 327 | | F/W/D/3_/4MR | Y | D | | | | |
| 328 | | <u> </u> / <u> </u> | Y | I | | | | |
| 329 | | F/O/I/47/___ | N | E | | | | |
| 330 | | F/O/K/48/___ | N | F | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-------|------------|---------|---------|
| 331 | F/O/A/61/___ | COF B | 4 | E | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|---|--------|---------|---------|----------|--------|-----------------|
| 331 | COF B | A/R/T/Y_/GRP | Y | A | | | | |
| 332 | | A/R/T/Y_/FWD | Y | B | | | | |
| 333 | | F/S/C/6_/LAI | Y | C | | | | |
| 334 | | F/W/D/6_/LAI | Y | D | | | | |
| 335 | | <u> </u> / <u> </u> | Y | I | | | | |
| 336 | | F/O/B/62/___ | N | F | | | | |
| 337 | | F/O/C/63/___ | N | G | | | | |

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UNCLASSIFIED

UNCLASSIFIED

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|--------------|------------|------------|------------|-------------|--------|--------------------|
| 338 | F/O/B/62/___ | COF B | 4 | F | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 339 | COF B | A/R/T/Y_/GRP | Y | A | | | | |
| 340 | | A/R/T/Y_/FWD | Y | B | | | | |
| 341 | | F/S/C/6_/LAI | Y | C | | | | |
| 342 | | F/W/D/6_/LAI | Y | D | | | | |
| 343 | | _/_/Q/5_/15_ | Y | I | | | | |
| 344 | | F/O/A/61/___ | N | E | | | | |
| 345 | | F/O/C/63/___ | N | G | | | | |
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 346 | F/O/C/63/___ | COF B | 4 | F | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 347 | COF B | A/R/T/Y_/GRP | Y | A | | | | |
| 348 | | A/R/T/Y_/FWD | Y | B | | | | |
| 349 | | F/S/C/6_/LAI | Y | C | | | | |
| 350 | | F/W/D/6_/LAI | Y | D | | | | |
| 351 | | _/_/Q/5_/15_ | Y | I | | | | |
| 352 | | F/O/A/61/___ | N | E | | | | |
| 353 | | F/O/B/62/___ | N | F | | | | |
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 354 | F/O/A/91/___ | COF A | 4 | E | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 355 | COF A | A/R/T/Y_/GRP | Y | A | | | | |
| 356 | | A/R/T/Y_/FWD | Y | B | | | | |
| 357 | | F/S/C/1_/29_ | Y | C | | | | |
| 358 | | F/W/D/1_/29M | Y | D | | | | |
| 359 | | _/_/K/3_/15_ | Y | I | | | | |
| 360 | | F/O/B/92/___ | N | F | | | | |
| 361 | | F/O/C/93/___ | N | G | | | | |
| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 362 | F/O/B/92/___ | COF A | 4 | F | N/A | | | |
| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
| 363 | COF A | A/R/T/Y_/GRP | Y | A | | | | |
| 364 | | A/R/T/Y_/FWD | Y | B | | | | |
| 365 | | F/S/C/1_/29_ | Y | C | | | | |
| 366 | | F/W/D/1_/29M | Y | D | | | | |
| 367 | | _/_/K/3_/15_ | Y | I | | | | |
| 368 | | F/O/A/91/___ | N | E | | | | |
| 369 | | F/O/C/93/___ | N | G | | | | |

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UNCLASSIFIED

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| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---------------|-------------|---------|---------|----------|--------|-----------------|
| 370 | F/O/C/93/___ | COF A | 4 | G | N/A | | | |
| 371 | COF A | A/R/T/Y_/GRP | Y | A | | | | |
| 372 | | A/R/T/Y_/FWD | Y | B | | | | |
| 373 | | F/S/C/1_/29_ | Y | C | | | | |
| 374 | | F/W/D/1_/29M | Y | D | | | | |
| 375 | | _I_/K/3_/15_ | Y | I | | | | |
| 376 | | F/O/A/91/___ | N | E | | | | |
| 377 | | F/O/B/92/___ | N | F | | | | |
| 378 | ___/15/MR_ | DIV FSC | 2_/3_/3_/4_ | 9 | N/A | | | |
| 379 | ___/15/MR_ | REGT FD | 1_/2_/2_/3_ | A | N/A | | | |
| 380 | ___/15/MR_ | TPC WIRE | 1_/2_/2_/3_ | A | N/A | | | |
| 381 | DIV FSC | F/S/C/6_/MD_ | BN FDC | 0 | 0 | 9Q/Q9 | OTHER | |
| 382 | | F/W/D/6_/DIV_ | BN FDC | 1 | 1 | 0Q/Q0 | OTHER | |
| 383 | | D/A/S/6_/AW_ | BN FDC | 2 | 2 | T0/0T | OTHER | |
| 384 | | D/A/S/6_/FWD | BN FDC | 3 | 3 | V2/2V | OTHER | |
| 385 | | F/S/C/4_/MR_ | BN FDC | 4 | 4 | 1R/R1 | OTHER | |
| 386 | | F/W/D/4_/MAR | BN FDC | 5 | 5 | 2R/R2 | OTHER | |
| 387 | | F/S/C/22/MR_ | BN FDC | 6 | 6 | 3R/R3 | OTHER | |
| 388 | | F/W/D/22/MAR | BN FDC | 7 | 7 | 4R/R4 | OTHER | |
| 389 | | F/S/C/29/MR_ | BN FDC | 8 | 8 | 5R/R5 | OTHER | |
| 390 | | F/W/D/29/MAR | BN FDC | ? | ? | 6R/R6 | OTHER | |
| 391 | | T/F/S/1_/MN_ | BN FDC | + | + | 7R/R7 | OTHER | |
| 392 | | T/F/S/1_/FWD | BN FDC | . | . | 8R/R8 | OTHER | |
| 393 | REGT FD | F/W/D/15/MAR | BN FDC | B | B | AA/BB | OTHER | |
| 394 | | ___/1_/15_ | BN FDC | C | C | CC/DD | OTHER | |
| 395 | | F/W/D/1_/15M | BN FDC | D | D | EE/FF | OTHER | |
| 396 | | ___/2_/15_ | BN FDC | E | E | GG/HH | OTHER | |
| 397 | | F/W/D/2_/15M | BN FDC | F | F | I/J/J | OTHER | |
| 398 | | ___/3_/15_ | BN FDC | G | G | KK/LL | OTHER | |
| 399 | | F/W/D/3_/15M | BN FDC | H | H | MM/ES | OTHER | |
| 400 | | ___/5_/15_ | BN FDC | I | I | OO/PP | OTHER | |
| 401 | | F/W/D/5_/15M | BN FDC | J | J | 99/00 | OTHER | |
| 402 | | A/R/T/Y_/GRP | BN FDC | K | K | GI/I | OTHER | |
| 403 | | A/R/T/Y_/FWD | BN FDC | L | L | GJ/JG | OTHER | |
| 404 | | _I_/A/6_/27_ | MLRS | M | M | GK/KG | OTHER | |
| 405 | TPC WIRE | T/P/C/15/MR_ | BN FDC | J | J | ME/EM | OTHER | |
| 406 | | F/W/D/15/TPC | BN FDC | K | K | PE/EP | OTHER | |
| 407 | T/P/C/15/MR_ | TPC WIRE | 2_/3_/3_/4_ | J | N/A | | | |
| 408 | T/P/C/15/MR_ | MET/RDR TEL | 1_/2_/2_/3_ | J | N/A | | | |

C-12-J-3-12

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------------|--------------|------------------|---------|---------|----------|--------|-----------------|
| 409 | TPC WIRE | F/S/C/6_/MD_ | RELAY/ BN FDC | A | A | | OTHER | |
| 410 | | F/W/D/6_/DIV | RELAY/ BN FDC | A | A | | OTHER | |
| 411 | | _/_/_/15/MR_ | BN FDC | A | A | EM/ME | OTHER | |
| 412 | | F/W/D/15/MAR | BN FDC | B | B | EO/OE | OTHER | |
| 413 | MET/RDR TEL | C/M/R/01/___ | Q-36 | L | | ET/TE | OTHER | |
| 414 | | C/M/R/02/___ | Q-36 | M | | EU/UE | OTHER | |
| 415 | | C/M/R/03/___ | Q-36 | N | | EV/VE | OTHER | |
| 416 | | C/M/R/04/___ | Q-36 | O | | FG/GF | OTHER | |
| 417 | | M/D/S/01/___ | MDS | 1 | | FH/HF | OTHER | |
| 418 | | M/D/S/02/___ | MDS | 2 | | FI/IF | OTHER | |
| 419 | | M/D/S/03/___ | MDS | 3 | | FJ/JF | OTHER | |
| 420 | | M/D/S/04/___ | MDS | 4 | | FK/KF | OTHER | |
| 421 | | U/A/V/09/___ | DMD | 7 | | UV/VU | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|-------------|---------|---------|
| 422 | _/_/_/1_/15_ | REGT FSC | 2_/3_/3_/4_ | I | N/A |
| 423 | _/_/_/1_/15_ | REGT FD | 2_/3_/3_/4_ | C | N/A |
| 424 | _/_/_/1_/15_ | COF A | 1_/2_/2_/3_ | A | N/A |
| 425 | _/_/_/1_/15_ | COF B | 1_/2_/2_/3_ | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|---------|---------|----------|--------|-----------------|
| 426 | REGT FSC | F/S/C/22/MR_ | BN FDC | A | A | 9F/F9 | OTHER | |
| 427 | | F/W/D/22/MAR | BN FDC | B | B | 9G/G9 | OTHER | |
| 428 | REGT FD | F/W/D/1_/15M | BN FDC | D | D | A2/2A | OTHER | |
| 429 | | _/_/_/15/MR_ | BN FDC | A | A | DD/CC | OTHER | |
| 430 | | F/W/D/15/MAR | BN FDC | B | B | RR/RQ | OTHER | |
| 431 | | _/_/_/2_/15_ | BN FDC | E | E | A3/3A | OTHER | |
| 432 | | F/W/D/2_/15M | BN FDC | F | F | A4/4A | OTHER | |
| 433 | | _/_/_/3_/15_ | BN FDC | G | G | A5/5A | OTHER | |
| 434 | | F/W/D/3_/15M | BN FDC | H | H | A6/6A | OTHER | |
| 435 | | _/_/_/5_/15_ | BN FDC | I | I | A7/7A | OTHER | |
| 436 | | F/W/D/5_/15M | BN FDC | J | J | A8/8A | OTHER | |
| 437 | | A/R/T/Y_/GRP | BN FDC | K | K | GL/LG | OTHER | |
| 438 | | A/R/T/Y_/FWD | BN FDC | L | L | GM/MG | OTHER | |
| 439 | | _/_/A/6_/27_ | MLRS | M | M | GN/NG | OTHER | |
| 440 | COF A | F/S/C/1_/22_ | BN FDC | C | C | M5/5M | OTHER | |
| 441 | | F/W/D/1_/22M | BN FDC | D | D | M6/6M | OTHER | |
| 442 | | F/O/A/21/___ | DMD | E | | M9/9M | FOWOL | |
| 443 | | F/O/B/22/___ | DMD | F | | M0/0M | FOWOL | |
| 444 | | F/O/C/23/___ | DMD | G | | N1/1N | FOWOL | |
| 445 | | _/_/A/1_/15_ | BCS | I | I | M7/7M | OTHER | |
| 446 | | F/S/C/2_/22_ | BN FDC | K | K | Q0/0Q | OTHER | |
| 447 | | F/W/D/2_/22M | BN FDC | L | L | R1/1R | OTHER | |
| 448 | | F/O/E/24/___ | DMD | M | | R4/4R | FOWOL | |
| 449 | | F/O/F/25/___ | DMD | N | | R5/5R | FOWOL | |
| 450 | | F/O/G/26/___ | DMD | O | | R6/6R | FOWOL | |
| 451 | | _/_/B/1_/15_ | BCS | 0 | 0 | R2/2R | OTHER | |

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UNCLASSIFIED

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-------|--------------|--------|---------|---------|----------|--------|-----------------|
| 452 | COF B | F/S/C/3_122 | BN FDC | C | C | V5/6V | OTHER | |
| 453 | | F/W/D/3_122M | BN FDC | D | D | V6/6V | OTHER | |
| 454 | | F/O/I/27/ | DMD | E | | V9/9V | FOWOL | |
| 455 | | F/O/K/28/ | DMD | F | | V0/0V | FOWOL | |
| 456 | | F/O/L/29/ | DMD | G | | AB/BA | FOWOL | |
| 457 | | _1_JC/1_115 | BCS | I | I | V7/7V | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|-------------|----------|------------|---------|---------|
| 458 | _1_1_12_115 | REGT FSC | 2_13_13_14 | I | N/A |
| 459 | _1_1_12_115 | REGT FD | 2_13_13_14 | E | N/A |
| 460 | _1_1_12_115 | COF A | 1_12_12_13 | A | N/A |
| 461 | _1_1_12_115 | COF B | 1_12_12_13 | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|---------|---------|----------|--------|-----------------|
| 462 | REGT FSC | F/S/C/4_1MR | BN FDC | A | A | 9F/F9 | OTHER | |
| 463 | | F/W/D/4_1MAR | BN FDC | B | B | 9G/G9 | OTHER | |
| 464 | REGT FD | F/W/D/2_115 | BN FDC | F | F | B5/5B | OTHER | |
| 465 | | _1_1_15/MR | BN FDC | A | A | HH/GG | OTHER | |
| 466 | | F/W/D/15/MAR | BN FDC | B | B | VV/UU | OTHER | |
| 467 | | _1_1_1_115 | BN FDC | C | C | 3A/A3 | OTHER | |
| 468 | | F/W/D/1_115M | BN FDC | D | D | 9A/A9 | OTHER | |
| 469 | | _1_1_3_115 | BN FDC | G | G | B6/6B | OTHER | |
| 470 | | F/W/D/3_115M | BN FDC | H | H | B7/7B | OTHER | |
| 471 | | _1_1_5_115 | BN FDC | I | I | B8/8B | OTHER | |
| 472 | | F/W/D/5_115M | BN FDC | J | J | B9/9B | OTHER | |
| 473 | | A/R/T/Y_1GRP | BN FDC | K | K | GO/OG | OTHER | |
| 474 | | A/R/T/Y_1FWD | BN FDC | L | L | GP/PG | OTHER | |
| 475 | | _1_1A/6_127 | MLRS | M | M | GQ/QG | OTHER | |
| 476 | COF A | F/S/C/1_14 | BN FDC | C | C | M5/5M | OTHER | |
| 477 | | F/W/D/1_14MR | BN FDC | D | D | M6/6M | OTHER | |
| 478 | | F/O/A/41/ | DMD | E | | M9/9M | FOWOL | |
| 479 | | F/O/B/42/ | DMD | F | | M0/0M | FOWOL | |
| 480 | | F/O/C/43/ | DMD | G | | N1/1N | FOWOL | |
| 481 | | _1_1E/2_115 | BCS | I | I | M7/7M | OTHER | |
| 482 | | F/S/C/2_14 | BN FDC | K | K | Q0/0Q | OTHER | |
| 483 | | F/W/D/2_14MR | BN FDC | L | L | R1/1R | OTHER | |
| 484 | | F/O/E/44/ | DMD | M | | R4/4R | FOWOL | |
| 485 | | F/O/F/45/ | DMD | N | | R5/5R | FOWOL | |
| 486 | | F/O/G/46/ | DMD | O | | R6/6R | FOWOL | |
| 487 | | _1_1F/2_115 | BCS | 0 | 0 | R2/2R | OTHER | |
| 488 | COF B | F/S/C/3_14 | BN FDC | C | C | V5/5V | OTHER | |
| 489 | | F/W/D/3_14MR | BN FDC | D | D | V6/6V | OTHER | |
| 490 | | F/O/I/47/ | DMD | E | | V9/9V | FOWOL | |
| 491 | | F/O/K/48/ | DMD | F | | V0/0V | FOWOL | |
| 492 | | F/O/L/49/ | DMD | G | | AB/BA | FOWOL | |
| 493 | | _1_1G/2_115 | BCS | I | I | V7/7V | OTHER | |

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| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|---------|---|------------|------------|
| 494 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | REGT FD | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | G | N/A |
| 495 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | COF A | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |
| 496 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | COF B | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|---|--------|------------|------------|-------------|--------|--------------------|
| 497 | REGT FD | F/W/D/3_/15M | BN FDC | H | H | C4/4C | OTHER | |
| 498 | | <u> </u> / <u> </u> / <u> </u> /MR | BN FDC | A | A | LL/KK | OTHER | |
| 499 | | F/W/D/15/MAR | BN FDC | B | B | 33/44 | OTHER | |
| 500 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | C | C | 5A/A5 | OTHER | |
| 501 | | F/W/D/1_/15M | BN FDC | D | D | 1B/B1 | OTHER | |
| 502 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | E | E | 6B/B6 | OTHER | |
| 503 | | F/W/D/2_/15M | BN FDC | F | F | 0B/B0 | OTHER | |
| 504 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | I | I | C5/5C | OTHER | |
| 505 | | F/W/D/5_/15M | BN FDC | J | J | C6/6C | OTHER | |
| 506 | | A/R/T/Y_/GRP | BN FDC | K | K | GR/RG | OTHER | |
| 507 | | A/R/T/Y_/FWD | BN FDC | L | L | GS/SG | OTHER | |
| 508 | | <u> </u> / <u> </u> A/6_/27 | MLRS | M | M | GT/TG | OTHER | |
| 509 | COF A | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BCS | I | I | M7/7M | OTHER | |
| 510 | COF B | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BCS | I | I | V7/7V | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|---------|---|------------|------------|
| 511 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | REGT FD | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | I | N/A |
| 512 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | COF A | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |
| 513 | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | COF B | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|---|--------|------------|------------|-------------|--------|--------------------|
| 514 | REGT FD | F/W/D/5_/15M | BN FDC | J | J | C9/9C | OTHER | |
| 515 | | <u> </u> / <u> </u> / <u> </u> /MR | BN FDC | A | A | PP/OO | OTHER | |
| 516 | | F/W/D/15/MAR | BN FDC | B | B | 88/77 | OTHER | |
| 517 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | C | C | 7A/A7 | OTHER | |
| 518 | | F/W/D/1_/15M | BN FDC | D | D | 3B/B3 | OTHER | |
| 519 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | E | E | 8B/B8 | OTHER | |
| 520 | | F/W/D/2_/15M | BN FDC | F | F | 2C/C2 | OTHER | |
| 521 | | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BN FDC | G | G | 5C/C5 | OTHER | |
| 522 | | F/W/D/3_/15M | BN FDC | H | H | 7C/C7 | OTHER | |
| 523 | | A/R/T/Y_/GRP | BN FDC | K | K | GU/UG | OTHER | |
| 524 | | A/R/T/Y_/FWD | BN FDC | L | L | GV/VG | OTHER | |
| 525 | | <u> </u> / <u> </u> A/6_/27 | MLRS | M | M | H/1H | OTHER | |
| 526 | COF A | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BCS | I | I | M7/7M | OTHER | |
| 527 | COF B | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | BCS | I | I | R2/2R | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|----------|---|------------|------------|
| 528 | A/R/T/Y_/GRP | REGT FSC | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | I | N/A |
| 529 | A/R/T/Y_/GRP | REGT FD | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | E | N/A |
| 530 | A/R/T/Y_/GRP | COF A | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |
| 531 | A/R/T/Y_/GRP | COF B | <u> </u> / <u> </u> / <u> </u> / <u> </u> / <u> </u> | A | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|----------|--------------|--------|---------|---------|----------|--------|-----------------|
| 532 | REGT FSC | T/F/S/1_/MN_ | BN FDC | A | A | 9F/F9 | OTHER | |
| 533 | REGT FD | A/R/T/Y_/FWD | BN FDC | L | L | HJ/JH | OTHER | |
| 534 | | _/_/15/MR_ | BN FDC | A | A | IG/GI | OTHER | |
| 535 | | F/W/D/15/MAR | BN FDC | B | B | JG/GJ | OTHER | |
| 536 | | _/_/11_/15_ | BN FDC | C | C | LG/GL | OTHER | |
| 537 | | F/W/D/1_/15M | BN FDC | D | D | HK/KH | OTHER | |
| 538 | | _/_/12_/15_ | BN FDC | E | E | OG/GO | OTHER | |
| 539 | | F/W/D/2_/15M | BN FDC | F | F | HL/LH | OTHER | |
| 540 | | _/_/13_/15_ | BN FDC | G | G | RG/GR | OTHER | |
| 541 | | F/W/D/3_/15M | BN FDC | H | H | HM/MH | OTHER | |
| 542 | | _/_/15_/15_ | BN FDC | I | I | UG/GU | OTHER | |
| 543 | | F/W/D/5_/15M | BN FDC | J | J | HN/NH | OTHER | |
| 544 | | _/_/A/6_/27_ | MRLS | M | M | HO/OH | OTHER | |
| 545 | COF A | F/S/C/1_/29_ | BN FDC | C | C | M5/5M | OTHER | |
| 546 | | F/W/D/1_/29M | BN FDC | D | D | M6/6M | OTHER | |
| 547 | | F/O/A/91/ | DMD | E | | M9/9M | FOWOL | |
| 548 | | F/O/B/92/ | DMD | F | | M0/0M | FOWOL | |
| 549 | | F/O/C/93/ | DMD | G | | N1/1N | FOWOL | |
| 550 | | _/_/K/3_/15_ | BCS | I | I | M7/7M | OTHER | |
| 551 | COF B | F/S/C/6_/LA1 | BN FDC | C | C | Q0/0Q | OTHER | |
| 552 | | F/W/D/6_/LA1 | BN FDC | D | D | R1/1R | OTHER | |
| 553 | | F/O/A/61/ | DMD | E | | R4/4R | FOWOL | |
| 554 | | F/O/B/62/ | DMD | F | | R5/5R | FOWOL | |
| 555 | | F/O/C/63/ | DMD | G | | R6/6R | FOWOL | |
| 556 | | _/_/Q/5_/15_ | BCS | I | I | R2/2R | OTHER | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|---------|------------|---------|---------|
| 557 | _/_/A/6_/27_ | REGT FD | 3 | M | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|---------|--------------|--------|---------|---------|----------|--------|-----------------|
| 558 | REGT FD | _/_/15/MR_ | BN FDC | A | | | | |
| 559 | | F/W/D/15/MAR | BN FDC | B | | | | |
| 560 | | _/_/11_/15_ | BN FDC | C | | | | |
| 561 | | F/W/D/1_/15M | BN FDC | D | | | | |
| 562 | | _/_/12_/15_ | BN FDC | E | | | | |
| 563 | | F/W/D/2_/15M | BN FDC | F | | | | |
| 564 | | _/_/13_/15_ | BN FDC | G | | | | |
| 565 | | F/W/D/3_/15M | BN FDC | H | | | | |
| 566 | | _/_/15_/15_ | BN FDC | I | | | | |
| 567 | | F/W/D/5_/15M | BN FDC | J | | | | |
| 568 | | A/R/T/Y_/GRP | BN FDC | K | | | | |
| 569 | | A/R/T/Y_/FWD | BN FDC | L | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------|-----------|------------|---------|---------|
| 570 | _/_/A/1_/15_ | COF A | 3 | I | N/A |
| 571 | _/_/A/1_/15_ | BTRY WIRE | 1 | I | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 572 | COF A | <u> </u> / <u> </u> | C | A | | | | |
| 573 | | F/W/D/1_15M | C | B | | | | |
| 574 | | F/S/C/1_22_ | V | C | | | | |
| 575 | | F/W/D/1_22M | V | D | | | | |
| 576 | | F/O/A/21/___ | T | E | | | | |
| 577 | | F/O/B/22/___ | T | F | | | | |
| 578 | | F/O/C/23/___ | T | G | | | | |
| 579 | BTRY WIRE | <u> </u> / <u> </u> /A/1_15_ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------------------------|-----------|------------|------------|------------|
| 580 | <u> </u> / <u> </u> /B/1_15_ | COF A | 3 | 0 | N/A |
| 581 | <u> </u> / <u> </u> /B/1_15_ | BTRY WIRE | 1 | 0 | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 582 | COF A | <u> </u> / <u> </u> | C | A | | | | |
| 583 | | F/W/D/1_15M | C | B | | | | |
| 584 | | F/S/C/2_22_ | V | K | | | | |
| 585 | | F/W/D/2_22M | V | L | | | | |
| 586 | | F/O/E/24/___ | T | M | | | | |
| 587 | | F/O/F/25/___ | T | N | | | | |
| 588 | | F/O/G/26/___ | T | O | | | | |
| 589 | BTRY WIRE | <u> </u> / <u> </u> /B/1_15_ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------------------------|-----------|------------|------------|------------|
| 590 | <u> </u> / <u> </u> /C/1_15_ | COF B | 3 | I | N/A |
| 591 | <u> </u> / <u> </u> /C/1_15_ | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 592 | COF A | <u> </u> / <u> </u> | C | A | | | | |
| 593 | | F/W/D/1_15M | C | B | | | | |
| 594 | | F/S/C/3_22_ | V | C | | | | |
| 595 | | F/W/D/3_22M | V | D | | | | |
| 596 | | F/O/I/27/___ | T | E | | | | |
| 597 | | F/O/K/28/___ | T | F | | | | |
| 598 | | F/O/L/29/___ | T | G | | | | |
| 599 | BTRY WIRE | <u> </u> / <u> </u> /C/1_15_ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------------------------|-----------|------------|------------|------------|
| 600 | <u> </u> / <u> </u> /E/2_15_ | COF A | 3 | 0 | N/A |
| 601 | <u> </u> / <u> </u> /E/2_15_ | BTRY WIRE | 1 | 0 | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-----------|----------------------|--------|---------|---------|----------|--------|-----------------|
| 602 | COF A | _ / / 2 / 15 _ | C | A | | | | |
| 603 | | F/W/D/2 / 15M | C | B | | | | |
| 604 | | F/S/C/1 / 4 _ | V | C | | | | |
| 605 | | F/W/D/1 / 4MR | V | D | | | | |
| 606 | | F/O/A/41/ _ | T | E | | | | |
| 607 | | F/O/B/42/ _ | T | F | | | | |
| 608 | | F/O/C/43/ _ | T | G | | | | |
| 609 | BTRY WIRE | _ / 2 / E / 2 / 15 _ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------------|-----------|------------|---------|---------|
| 610 | _ / / F / 2 / 15 _ | COF A | 3 | 0 | N/A |
| 611 | _ / / F / 2 / 15 _ | BTRY WIRE | 1 | 0 | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-----------|----------------------|--------|---------|---------|----------|--------|-----------------|
| 612 | COF A | _ / / 2 / 15 _ | C | A | | | | |
| 613 | | F/W/D/2 / 15M | C | B | | | | |
| 614 | | F/S/C/2 / 4 _ | V | K | | | | |
| 615 | | F/W/D/2 / 4MR | V | L | | | | |
| 616 | | F/O/A/42/ _ | T | M | | | | |
| 617 | | F/O/B/43/ _ | T | N | | | | |
| 618 | | F/O/C/44/ _ | T | O | | | | |
| 619 | BTRY WIRE | _ / 2 / F / 2 / 15 _ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|--------------------|-----------|------------|---------|---------|
| 620 | _ / / G / 2 / 15 _ | COF A | 3 | I | N/A |
| 621 | _ / / G / 2 / 15 _ | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|-----------|----------------------|--------|---------|---------|----------|--------|-----------------|
| 622 | COF A | _ / / 2 / 15 _ | C | A | | | | |
| 623 | | F/W/D/2 / 15M | C | B | | | | |
| 624 | | F/S/C/3 / 4 _ | V | C | | | | |
| 625 | | F/W/D/3 / 4MR | V | D | | | | |
| 626 | | F/O/A/47/ _ | T | E | | | | |
| 627 | | F/O/B/48/ _ | T | F | | | | |
| 628 | | F/O/C/49/ _ | T | G | | | | |
| 629 | BTRY WIRE | _ / 2 / G / 2 / 15 _ | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|----------------|-----------|------------|---------|---------|
| 630 | _ / / 3 / 15 _ | COF A | 3 | I | N/A |
| 631 | _ / / 3 / 15 _ | BTRY WIRE | 1 | I | N/A |

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| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 632 | COF A | <u> </u> / <u> </u> | C | A | | | | |
| 633 | | F/W/D/3_/15M | C | B | | | | |
| 634 | BTRY WIRE | <u> </u> / <u> </u> | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|-----------|------------|------------|------------|
| 635 | <u> </u> / <u> </u> | COF A | 3 | I | N/A |
| 636 | <u> </u> / <u> </u> | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 637 | COF A | A/R/T/Y_/GRP | C | A | | | | |
| 638 | | A/R/T/Y_/FWD | C | B | | | | |
| 639 | | F/S/C/1_/29_ | V | C | | | | |
| 640 | | F/W/D/1_/29M | V | D | | | | |
| 641 | | F/O/A/91/___ | T | E | | | | |
| 642 | | F/O/B/92/___ | T | F | | | | |
| 643 | | F/O/C/93/___ | T | G | | | | |
| 644 | BTRY WIRE | <u> </u> / <u> </u> | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|-----------|------------|------------|------------|
| 645 | <u> </u> / <u> </u> | COF B | 3 | I | N/A |
| 646 | <u> </u> / <u> </u> | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 647 | COF A | <u> </u> / <u> </u> | C | A | | | | |
| 648 | | F/W/D/3_/15M | C | B | | | | |
| 649 | BTRY WIRE | <u> </u> / <u> </u> | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|-----------|------------|------------|------------|
| 650 | <u> </u> / <u> </u> | COF B | 3 | I | N/A |
| 651 | <u> </u> / <u> </u> | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 652 | COF A | A/R/T/Y_/GRP | C | A | | | | |
| 653 | | A/R/T/Y_/FWD | C | B | | | | |
| 654 | | F/S/C/6_/LAI | V | C | | | | |
| 655 | | F/W/D/6_/LAI | V | D | | | | |
| 656 | | F/O/A/61/___ | T | E | | | | |
| 657 | | F/O/B/62/___ | T | F | | | | |
| 658 | | F/O/C/63/___ | T | G | | | | |
| 659 | BTRY WIRE | <u> </u> / <u> </u> | N | J | | | | |

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| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|-----------|------------|------------|------------|
| 660 | <u> </u> / <u> </u> / <u> </u> R/ <u> </u> / <u> </u> 15 | COF A | 3 | I | N/A |
| 661 | <u> </u> / <u> </u> / <u> </u> R/ <u> </u> / <u> </u> 15 | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|---|--------|------------|------------|-------------|--------|--------------------|
| 662 | COF A | <u> </u> / <u> </u> / <u> </u> 15 | C | A | | | | |
| 663 | | F/W/D/ <u> </u> / <u> </u> 15M | C | B | | | | |
| 664 | BTRY WIRE | <u> </u> / <u> </u> / <u> </u> R/ <u> </u> / <u> </u> 15 | N | J | | | | |

| LINE # | OWN NAME | NET | NET ACCESS | PHY ADD | MOI ADD |
|--------|---|-----------|------------|------------|------------|
| 665 | <u> </u> / <u> </u> / <u> </u> S/ <u> </u> / <u> </u> 15 | COF B | 3 | I | N/A |
| 666 | <u> </u> / <u> </u> / <u> </u> S/ <u> </u> / <u> </u> 15 | BTRY WIRE | 1 | I | N/A |

| LINE # | NET | LOGICAL NAME | DEVICE | PHY ADD | MOI ADD | SID CODE | AGENCY | MULTISUBS GROUP |
|--------|--------------|--|--------|------------|------------|-------------|--------|--------------------|
| 667 | COF A | <u> </u> / <u> </u> / <u> </u> 3/ <u> </u> 15 | C | A | | | | |
| 668 | | F/W/D/ <u> </u> / <u> </u> 3/ <u> </u> 15M | C | B | | | | |
| 669 | BTRY WIRE | <u> </u> / <u> </u> / <u> </u> L/ <u> </u> / <u> </u> 3/ <u> </u> 15 | N | J | | | | |

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Appendix J

Continuity of Technical Fire Direction

1. General

The procedures listed in this appendix are used to ensure that a standardized, verified data base is created. Since a computer can only produce one set of data for a given set of parameters, verification of entry data is stressed vice the cross-checking of output (firing) data.

2. Construct Data Bases

- a. The FDO provides known data to the FDC.
- b. The OpsChf records the known data on the record of data base. As each element is recorded, the OpsChf announces the data aloud. (The data can be printed at the BCS in place of copying by hand.)
- c. The BCS operator reads back the data as he enters it in the appropriate format.
- d. The Backup Computer System (BUCS) operator completes the appropriate field of the BUCS program and announces "check" if the entry that he heard matches the data read back, or announces "hold" if the data that he heard disagrees with the BCS operator's read back.
- e. The OpsChf will announce "correction [data]" if the data is read back incorrectly or if "hold" was announced, or he will announce "execute" if the data is correct. (The OpsChf will watch the LCU display as an additional check.)
- f. When the OpsChf commands "execute," the BCS operator will prepare to enter the next field, and the BUCS operator will select **ENDLINE**. If the last action completes the format, the BCS operator will execute.

g. The remainder of the data base will be constructed in this manner. (If time allows, a file-by-file comparison of the BUCS and BCS data base is made under the supervision of the FDO or OpsChf.)

3. Determine GFT Setting and Bring BUCS On-Line With BCS

a. The OpsChf or FDO selects a gun to be used as the base piece for manual operations.

b. The BCS operator enters the base piece grid in the BCS as an observer by selecting —

INDEX

1 EXECUTE

7 EXECUTE

OBS:__; [enter 99]

CORD: ____/____/__; [enter base piece easting/northing/altitude]

c. The horizontal control operator (HCO) plots the base piece location on the firing chart, tickmarks this as the firing unit, and constructs deflection indices.

d. The OpsChf or FDO selects the ranges and charges to be used in the determination of graphical firing table (GFT) settings and for which BUCS will be brought on-line with the BCS. The range selected should be a meteorological (met) check gauge point range. This is determined by placing the manufacturer's hairline (MHL) over the red triangles below the elevation scale of the GFT. At a minimum, a single range is selected near the center of the GFT's range span. If sufficient time is available, more ranges are selected and the process described in the following paragraph is repeated to determine multiplot GFT settings for manual backup. If a GFT is not available, table A of a tabular firing table (TFT) is entered to determine the elevation at the center of the elevation span for a chosen met line number. The corresponding range is a met check gauge point range.

e. The BCS operator makes the appropriate entries on the **FM;CFF**, selecting —

INDEX

2 EXECUTE

2 EXECUTE

DIR:___/___; [enter azimuth of lay in first subfield]

DIST:___; [enter range from paragraph 3d]

SHIFT:___/___/___/___; [enter **D** in fifth subfield, **20** in sixth subfield]

OBS:___; [enter **99**]

ASF:___/___; [enter **HEF/TIB** if **GFT** setting is for **DPICM**]

SH:___ [enter shell for which **GFT** setting is being determined]

FZ:___ [enter appropriate time fuze]

LOTS:___/___/___; [enter lots chosen by the **FDO**]

PTF:___; [enter base piece gun number]

ADJ:___; [enter base piece gun number]

SHEAF:___; [enter **CONV**]

NOTE: A range in excess of 9999 meters cannot be entered in the **DIST** field. Distances in excess of 9999 meters must be entered in two steps. First make the appropriate entries in the **FM;CFF** using a distance of **9999** and execute. Ignore the resulting firing data. Process a **FM;SUBS** with the **TGT** field and the remainder of the desired range as an add correction in the **SHIFT** field.

f. The BCS operator executes and then records the firing data.

g. The BCS operator returns to the related message and records the **CORD** field grid and altitude.

h. The BCS operator announces the data: **GUN** [number], **LOT** [lot designators], **CHG** [number], **TI** [fuze setting], **DF** [value], **QE** [value].

i. The BUCS operator makes the following appropriate entries in the BUCS:

MAIN INDEX

1 ENDLINE

6 ENDLINE

EAST:_____ [enter easting from paragraph 3g]

NORTH:_____ [enter northing from paragraph 3g]

ALT:___ [enter altitude from paragraph 3g]

PROJ:___ [enter shell for which the BCU computed data]

LOT:___ [enter lot for which the BCU computed]

FUZE:___ [enter fuze for which the BCU computed]

REG PIECE:___ [enter base piece gun number]

CHARGE:___ [ensure that charge to be brought on line is displayed;
change charge selected by BUCS as required]

j. Data is displayed. Ignore this data. The BUCS operator enters the data, reading back that data at each step. Upon hearing the correct read-back, the OpsChf/FDO will announce "check." The BUCS operator will then select **ENDLINE** and make the following entries:

BCS TI:___ [enter time computed by BCS]

BCS DF:___ [enter deflection computed by BCS]

BCS QE:___ [enter QE computed by BCS]

k. The BUCS computes residuals. When residuals are displayed by the BUCS, the BUCS operator announces each residual.

l. The OpsChf reads back and records the residuals.

m. The OpsChf/FDO examines the residuals and directs the BUCS operator to store them and end the mission if they are judged correct.

n. The recorder determines a GFT setting from the BCS data determined in paragraph 3h.

o. The QE determined is the GFT setting elevation.

p. The time determined is the GFT setting time.

- q. The total deflection (DF) correction is determined by the formula:

$$\text{BCS DF} - \text{Common DF} = \text{Total DF Correction}$$

- r. Drift is determined by placing the MHL of the GFT over the elevation from paragraph 3f. Read drift from the MHL.

- s. GFT deflection correction is determined by the formula:

$$\text{Total DF Correction} - \text{Drift@Adjusted Elevation} = \text{GFT DF Correction}$$

- t. The chart range is the polar plot range entered to determine the GFT setting.

4. Determine Terrain Gun Position Corrections

- a. The BCU operator will process a dry-fire subsequent correction to the fire mission established in paragraph 3f by making the following entries:

INDEX
2 EXECUTE
3 EXECUTE
TGT: _____; [enter target number]
CONT: ___/___; [enter FFE in second subfield]
PTF: _____; [enter BTRY]
EXECUTE

- b. The BCS operator announces the firing data to the OpsChf.
- c. The OpsChf records and reads back the data.
- d. The OpsChf computes terrain gun position corrections (TGPCs) with the following formulas:

$$\text{Gun \# __ Time-Base Piece Time} = \text{Gun \# __ Time Correction}$$

$$\text{Gun \# __ DF-Base Piece DF} = \text{Gun \# __ DF Correction}$$

$$\text{Gun \# __ QE-Base Piece QE} = \text{Gun \# __ QE Correction}$$

- e. The TGPCs for the remaining pieces are then computed.

- f. The corrections are announced to the guns to allow the FDC to send one set (base piece) of firing data and still fire a battery special sheaf. The TGPCs are valid 2000 meters over and short of the center of sector range and 400 mils left and right of the center deflection.

- g. The LCU operator displays a blank **FM;SUBS** and enters **EOM:X;** and **RAT:T;** messages.

Appendix K

Fire Mission Logs

1. Instructions for Completing the FSCC Mission Log

The fire mission log (figure K-1) is used by the FSCC to track fire missions received at the LCU. Each line of the form is used for a single mission. The columns are completed as follows:

a. Column 1 — TGT NUMBER

Enter the target number of the received mission.

b. Column 2 — EAST

Enter easting coordinates of the mission target.

c. Column 3 — NORTH

Enter the northing coordinates of the mission target.

d. Column 4 — FO

Enter the observer number of the observer requesting fires.

e. Column 5 — CLRD

Enter "C" for cleared or "D" for denied followed by the time of decision.

f. Column 6 — FIRE SUPPORT MEANS ASSIGNED

Enter the fire support means assigned; e.g., "ARTY," "NGF," "AIR," "MORT."

g. Column 7 — REQ CLRD AGENCY

If the mission must be cleared by another FSCC, enter that agency's tag name.

h. Column 8 — REQ CLRDR TIME

If the mission must be cleared by another FSCC, enter the time clearance was requested.

i. Column 9 — XMIT TO BN FDC TIME

Enter the time the cleared mission was transmitted to the battalion FDC.

j. Column 10 — EOM TIME

Enter the time "end of mission" was received.

k. Column 11 — DISPOSITION

Enter the disposition of the target as received on the **FM;SUBS**.

2. Instructions for Completing the FDC Mission Log

The fire mission log (figure K-2) is used by the FDC to track fire missions received at the LCU. This is not a complete record. The FDC should print the **MISSION FIRED FILE** for a record of targets engaged. This record is an aid to maintaining control of operations. Each line of the form is used for a single mission or correction. The columns are completed as follows:

a. Column 1 — TGT NUMBER

Enter the target number of the received mission or correction.

b. Column 2 — EAST

Enter easting coordinates of the mission target or subsequent correction.

c. Column 3 — NORTH

Enter the northing coordinates of the mission target or subsequent correction.

d. Column 4 — ALT

Enter the plotted altitude of the mission target.

e. Column 5 — FO

Enter the observer number of the observer requesting fires.

f. Column 6 — CLRD

Enter "C" for cleared or "D" for denied, followed by the time of decision, or enter "EOM" and time when mission is ended.

g. Column 7 — REQ CLRD AGENCY

If the mission must be cleared by another FSCC, enter that agency's tag name.

h. Column 8 — REQ CLRD TIME

If the mission must be cleared by another FSCC, enter the time clearance was requested.

i. Column 9 — XMIT TO BTRY TIME

Enter the time the cleared mission was transmitted to the battery FDC.

j. Column 10 — SHOT TIME

Enter the time "shot" was received from each battery; e.g., A-1305, B-1306, C-1305.

k. Column 11 — ROUNDS CMPLT TIME

Enter the time "rounds complete" was received from each battery; e.g., A-1307, B-1308, C-1307.

l. Each line will be entered in the order missions and corrections are received without attempting to keep all corrections for a mission together on the log.

Appendix L

Glossary

A

| | |
|------------|---|
| AAV | assault amphibious vehicle |
| ACA; ACA | airspace coordination area |
| ACK | acknowledge |
| ADAM | area denial artillery munition |
| ADDR | address, addressee |
| ADJ | adjust, adjustment |
| ADP | automated data processing |
| AFATDS | advanced field artillery tactical data system |
| AFU | artillery fire unit |
| AGSM | Army ground station module |
| alt | alternate; altitude |
| ALT | altitude |
| AMC | at my command |
| ammo; AMMO | ammunition |
| AMOE | ammunition expended |
| AMOH | ammunition on hand |
| AMOL | ammunition level |
| AMOR | ammunition received |
| ANGLET | angle T |
| AO; AO | aerial observer |
| AP | additional points |
| APICM | antipersonnel improved conventional munition |
| APL | applicable ammunition |
| arty; ARTY | artillery |
| ASE | air support element |
| ASF | adjusting shell-fuze |
| ASR | available supply rate |
| ATACMS | Army tactical missile system |
| ATHS | airborne target handover system |
| ATI | artillery target intelligence |
| ATIZ | artillery target intelligence zone |
| ATK | attack |
| ATT | attitude |
| AUF | adjusting unit |
| AUTO | automatic |

AZ azimuth
 AZR azimuth-distance report

B

BCS battery computer system
 BCT battlefield computer terminal
 BD battle damage
 BGEOM battlefield geometry
 BLT battalion landing team
 bn; BN battalion
 Bn FD Net battalion fire direction net
 BOC battery operations center
 bps bits per second
 btry; BTRY battery
 BUCS backup computer system

C

C confidential
 CAS close air support
 CAS casualty
 CAV communications authenticator variable
 CBR counterbattery radar
 CBTI combat information
 CC communications check
 C^cC confidential crypto
 CDR coordinate report
 CF counterfire
 CFF call for fire
 CFFO call for fire order
 CFFZ call for fire zone
 CFL; CFL coordinated fire line
 CFR confidential formerly restricted
 CFZ critical friendly zone
 CHA chemical hazard area
 CHEM chemical
 CHG charge
 CM computer met
 CMR countermortar radar
 CNO cannot observe

| | |
|----------------|----------------------------|
| COF | conduct of fire net |
| COMD | command |
| COMFP | compute fire plan |
| comm | communications |
| COMSEC | communications security |
| CONT | control |
| CONV | converged |
| COORD | coordination |
| CORD | coordinates |
| CORR | correction |
| CP | command post |
| CPRHD | Copperhead |
| CRG | counterfire reference grid |
| CRIT | critical |
| crypto; CRYPTO | cryptological |
| CSR | controlled supply rate |
| CTS | cosmic top secret |
| CZ | sensor zone |

D

| | |
|-------------|--|
| D | data |
| D | down |
| DASC | direct air support center |
| DC | danger close |
| DD | division damage |
| DES | destruction mission |
| DEST | destroyed |
| df; DF | deflection |
| DIR | direction |
| DIS; DIST | distance |
| DISP | disposition |
| div | division |
| Div FSC Net | division fire support coordination net |
| DMD | digital message device |
| DMS | AN/PSC-2A digital message system |
| DNA | do not adjust |
| DNARV | do not adjust report value |
| DNC | do not combine |
| DNL | do not load |
| DNO | did not observe |

DOP degree of protection
 DPICM dual purpose improved conventional munition
 DPMOD data print modification
 DS direct support
 DSA dead space area
 DSCP dual station command post
 DTG date-time group

E

ECOF effects cutoff factor
 EDC error detection and correction
 EDTG effective date-time group
 EFF effects
 EFFCY efficiency
 EOM end of mission
 ETO encrypt for transmission only
 EXECFP execute fire plan

F

FADAC M18 field artillery digital automated computer
 FASCAM family of scatterable mines
 FCTN function
 FD fire direction
 FDC fire direction center
 FDO fire direction officer
 FDS fire direction system
 FFA; FFA free fire area
 FFC force fires coordinator
 FFCC force fires coordination center
 FFE; FFE fire for effect
 FISTDMD fire support team digital message device
 FLOT; FLOT forward line of own troops
 FM frequency modulation; U.S. Army field manual
 FM fire mission
 FMFM Fleet Marine Force manual
 FM MOD fire mission modification
 FO; FO forward observer
 FOCMD FO command
 FOWOL forward observer without laser

| | | |
|-------------------|-------|-----------------------------------|
| FP | ..... | fire plan |
| FPA | ..... | fire plan alteration |
| FPAMMO | ..... | fire plan ammunition report |
| FPF; FPF | ..... | final protective fires |
| FPLST | ..... | fire plan preliminary target list |
| FPSUM | ..... | fire plan summary report |
| FPTGT | ..... | fire plan target list |
| FPTU | ..... | fire planning target update |
| FR | ..... | fire request |
| FSC | ..... | fire support coordinator |
| FSCC | ..... | fire support coordination center |
| FSCL; FSCL | ..... | fire support coordination line |
| FSCM | ..... | fire support coordination measure |
| FSCoord | ..... | fire support coordinator |
| FSE | ..... | fire support element |
| FSK; FSK | ..... | frequency shift keying |
| FSP | ..... | force supported |
| FU | ..... | fire unit |
| FUSEL | ..... | fire unit selection |
| fwd | ..... | forward |
| FZ | ..... | fuze |

G

| | | |
|---------------|-------|--------------------------------------|
| GCE | ..... | ground combat element |
| GDU | ..... | gun display unit |
| GEOM | ..... | geometry |
| GFT | ..... | graphical firing table |
| GLLDCO | ..... | ground laser locator designator code |
| GRP | ..... | group |
| GS | ..... | general support |
| GS-R | ..... | general support-reinforcing |
| GT | ..... | gun-target |
| GZ | ..... | grid zone |

H

| | | |
|---------------|-------|---------------------------|
| HB | ..... | high burst |
| HCO | ..... | horizontal chart operator |
| HE; HE | ..... | high explosive |
| HF | ..... | high frequency |

HOB height of burst
 HPT high payoff target
 HPTL high payoff target list

I

ICM improved conventional munition
 ID identify; identification
 I/E in effect
 IFSAS initial fire support automated system
 IGAMMO ignore ammunition
 ILL illumination
 inf infantry
 INIT initialization
 INST instructions
 ITS individual training standard

J

JMEM joint munitions effectiveness manual
 JSTARS joint surveillance target attack radar system

K

KNPT known point

L

LAR light armored reconnaissance
 LCU AN/GYK-37 lightweight computer unit
 LFSZ laid FASCAM safety zone
 LGSB legal subscriber
 LIN linear
 LnChf liaison chief
 LnO liaison officer
 LRRP long-range reconnaissance patrol
 LTACFIRE light tactical fire direction system

M

| | |
|-----------------|---------------------------------------|
| MAGTF | Marine air-ground task force |
| MAJORX | semi-major axis |
| MAP MOD | map modification |
| MAT | materiel |
| MAX | maximum |
| MAXEL | maximum elevation |
| MAXRNG | maximum range |
| MAXRTE | maximum rate |
| MAXVOL | maximum volley |
| MCFSS | Marine Corps fire support system |
| MDS | AN/TMQ-4 meteorological data system |
| ME | method of engagement |
| MEF | Marine expeditionary force |
| MEF(F) | Marine expeditionary force (forward) |
| MEF FFC Net | MEF force fires coordination net |
| met; MET | meteorological |
| Met/Rdr Tel Net | meteorological data/radar telling net |
| MEU | Marine expeditionary unit |
| MF | method of fire |
| MFR | mission fired report |
| MHL | manufacturer's hairline |
| MIL | military |
| MIN | minimum |
| MINORX | semi-minor axis |
| MINRNG | minimum range |
| MIS | mission |
| MLF | maximum limiting factor |
| MLRS | multiple launch rocket system |
| MMS | meteorological measuring system |
| MOD | modification |
| MOD FILE | modification file |
| MOI | message of interest |
| MPI | mean point of impact |
| MSG | message |
| MSL | mean sea level |
| MSN | mission |
| MTO | message to observer |
| MVTGT | moving target |
| MVV | muzzle velocity variant |

N

| | |
|-----------|----------------------------|
| NAK | negative acknowledgement |
| NC | NATO confidential |
| NCS | net control station |
| NEUT | neutralized |
| NFA; NFA | no fire area |
| NLT | no later than |
| NNFP | nonnuclear fire planning |
| NS | NATO secret |
| NSFS | naval surface fire support |
| NUC; NUKE | nuclear |

O

| | |
|-----------|---------------------|
| OBCO | observer location |
| obj | objective |
| OBS; OBSR | observer |
| ONC | on-call |
| ONCALL | on-call target list |
| OP | observation post |
| OpsChf | operations chief |
| ORD | ordnance |
| OS | orienting station |
| OT | observer-target |

P

| | |
|------------|--|
| PCLD; PCLD | priority, classification, logging, and display |
| PERS | personnel |
| PFSZ | primary FASCAM safety zone |
| PG | page |
| PL | phase line |
| PREFP | prepare fire plan |
| PRES | pressure |
| PRF | pulse repetition frequency |
| PRI | priority |
| PROP | propellant |
| PT | plain text |
| PTEMP | powder temperature |
| PTF | pieces to fire |
| PTM | plain text message |

PZ primary zone

Q

Q tactical factor
Q-36 AN/TPQ-36 firefinder radar
QE; QE quadrant elevation
QF quick response fire
QMOD tactical factor modification

R

R reinforcing
RAAM remote antiarmor munition
RAD radius
RAOC rear area operations center
RAP rocket assisted projectile
RDCOMP rounds complete
RECALC recalculate
REG registrating
regt regiment
Regt FD Net regimental fire direction net
Regt FSC Net regimental fire support coordination net
REL reliability
RESFU reserve fire unit
RFA; RFA restricted fire area
RFAF request for additional fire
RFL; RFL restricted fire line
RG range
RPF relative proximity factor
RS radiation status
RT reaction time
RV report value

S

S secret
SACC supporting arms coordination center
SB subscriber
SBT subscriber table
S*C secret crypto

| | | |
|----------------|-------|---|
| SCDFIRE | ..... | schedule of fires report |
| SCP | ..... | survey control point |
| SCPST | ..... | survey control point storage |
| SEL | ..... | select |
| SER | ..... | serial |
| SFR | ..... | secret formerly restricted |
| SH | ..... | shell |
| SHELREP | ..... | shelling report |
| SHFCOR | ..... | shift correction |
| SID | ..... | subscriber identification code |
| SINGARS | ..... | single channel ground and airborne radio system |
| SITREP | ..... | situation report |
| SKED | ..... | schedule |
| SMK | ..... | smoke |
| SNF | ..... | secret no foreign dissemination |
| SOP | ..... | standing operating procedure |
| SPD | ..... | speed |
| SPINT | ..... | special instructions |
| SPR | ..... | salvage point recording |
| SPRT | ..... | support |
| SRCH | ..... | search |
| SRD | ..... | secret restricted data |
| SRI | ..... | standing request for information |
| SSCP | ..... | single station command post |
| STANAG | ..... | standard agreement |
| STAT | ..... | status |
| STDMET | ..... | standard meteorological data |
| STR | ..... | strength |
| SUBS | ..... | subsequent |
| SVF | ..... | standard volley factor |
| SVL | ..... | surveillance |
| SVMOD | ..... | standard value modification |
| SYNC | ..... | synchronization |
| SYS | ..... | system |

T

| | | |
|----------------|-------|----------------------------------|
| TACFIRE | ..... | tactical fire direction system |
| TARBUL | ..... | target bulletin |
| TBMOD | ..... | target buildup modification file |
| TCRIT | ..... | targeting criteria |

| | |
|-----------------|----------------------------------|
| TDA | target damage assessment |
| TEMP | temperature |
| TFT | tabular firing table |
| TGPC | terrain gun position correction |
| TGR | target report |
| TGT | target |
| THM | thermal homing munition |
| TI | time |
| TIMEX | maximum target age |
| TIMEY | maximum time difference |
| TISF | targets in the schedule of fires |
| TM | technical manual |
| TOT; TOT | time on target |
| TPAC | trigonometric point access |
| TPC | target processing center |
| TRAVLR | traverse left and right |
| TS | top secret |
| TVA | target value analysis |
| TVAREA | target value area |

U

| | |
|--------------------|-------------------------------|
| U | up |
| UAV | unmanned aerial vehicle |
| UFFE; UFFES | units to fire for effect |
| UN | unclassified |
| UNK | unknown |
| UREINF | unit reinforced |
| UTM | universal transverse mercator |

V

| | |
|--------------|--------------------|
| V | voice |
| VERT | vertical |
| VISIB | visibility |
| VOL | volley(s) |
| VSF | volley size factor |

W

WDOP weighted degree of protection
WP white phosphorus
WPN weapon
WR when ready
WSIZE weighted size
WSTR weapon strength
WTYP weighted type

X

XCLUDE exclude
XMIT transmit
XSCD scheduling instructions for XTGT
XTGT target to be transmitted

Z

ZF zone fire
ZONE zone

Appendix M

References and Related Publications

1. Joint Publications

Joint Pub 1-02 *Department of Defense Dictionary of Military
and Associated Terms*

2. Fleet Marine Force Manuals

FMFM 1-7/NWP 22-2 *Supporting Arms in Amphibious Operations*
FMFM 2-7 *Fire Support in MAGTF Operations*
FMFM 2-7-1 *Fire Support Coordination by the MAGTF
Command Element*
FMFM 3 *Command and Control*
FMFM 3-1 *Command and Staff Action*
FMFM 3-30 *Communications*
FMFM 5-40 *Offensive Air Support*
FMFM 5-41 *Close Air Support and Close-in Fire Support*
FMFM 6 *Ground Combat Operations (under
development)*
FMFM 6-8 *Supporting Arms Observer, Spotter, and
Controller*
FMFM 6-9 *Marine Artillery Support*
FMFM 6-18 *Techniques and Procedures for Fire Support
Coordination*
FMFM 6-18-2 *Commander's Guide for the MCFSS (under
development)*
FMFM 6-22/TC 6-40 *Field Artillery Manual Cannon Gunnery*
FMFM 6-23/TC 6-40A *Field Artillery Automated Cannon Gunnery*

3. Fleet Marine Force Reference Publications/U.S. Army Field Manuals (To be dual designated as FM/FMFRP upon revision. Publications not currently at MCLB Albany may be ordered from Commandant, USAFAS, Attn: ATSF-DD, Fort Sill, OK 73503-5600.)

| | |
|--------------------------------|---|
| FMFRP 6-6-2/FM 6-2 | <i>Field Artillery Survey</i> |
| FMFRP 6-6-15/ FM 6-15 | <i>Field Artillery Meteorology</i> |
| FMFRP 6-6-20/ FM 6-20 | <i>Fire Support in Airland Operations</i> |
| FMFRP 6-6-20-1/ FM 6-20-1 | <i>Field Artillery Cannon Battalion</i> |
| FMFRP 6-6-20-10/ FM 6-20-10 | <i>Tactics, Techniques, and Procedures for the Targeting Process</i> |
| FMFRP 6-6-20-30/ FM 6-20-30 | <i>Tactics, Techniques, and Procedures for Fire Support for Corps and Division Operations</i> |
| FMFRP 6-6-20-40/ FM 6-20-40 | <i>Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Heavy)</i> |
| FMFRP 6-6-20-50/ FM 6-20-50 | <i>Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Light)</i> |
| FMFRP 6-6-30/ FM 6-30 | <i>Observed Fire Procedures</i> |
| FMFRP 6-6-50/ FM 6-50 | <i>Field Artillery Cannon Battery</i> |
| FMFRP 6-6-60/ FM 6-60 | <i>Multiple Launch Rocket System (MLRS)</i> |
| FMFRP 6-6-121/ FM 6-121 | <i>Field Artillery Target Acquisition</i> |

4. Joint Munitions Effectiveness Manuals

Joint Munitions Effectiveness Manuals (JMEMs) are in the FMFM 4-7 series and are classified. FSCs should already have access to the JMEMs for the weapons to be used.

5. U.S. Marine Corps Technical Manuals

TM 08625A-10/1-1&2 *Meteorological Data System AN/TMQ-31*
TM 2000-12/3 *Operator's Job Aids for the Battlefield*
 Computer Terminal V9.57

6. U.S. Army Technical Manuals

TM 11-7440-253-10 *Operator's Manual for Message Entry Device,*
 Variable Format, AN/GSC-21 (VFMED)
TM 11-5840-354-10 *Operator's Manual for Radar Sets*
 AN/TPQ-36(V)3

7. U.S. Army Field Artillery School Special Texts

(Order from Commandant, USAFAS, Attn: ATSF-DD, Fort Sill, OK
73503-5600.)

ST 6-1-1 *LTACFIRE Operations*
ST 6-3 *Advanced Field Artillery Tactical Data System*
 (AFATDS) Operations (under development)
ST 6-40-2 *Field Artillery Battery Computer System*
 Cannon Gunnery Version 10 (under
 development)
ST 6-40-30 *Battery Computer System Job Aids*
ST 6-40-31 *Field Artillery Backup Computer System*
 (BUCS) Special Text